

ANNUAL MANAGEMENT REPORT KUSKOKWIM AREA, 1989

By:

R. Kim Francisco
Charles Burkey Jr.
Douglas B. Molyneaux
Cindy J. Anderson
Helen H. Hamner
D. J. Schneiderhan
Michael W. Coffing
Robert J. Walker
Karen E. Hyer

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AUTHORS

R. Kim Francisco is Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 90, Bethel, AK 99559-0090

Charles Burkey Jr. is Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 90, Bethel, AK 99559-0090

Douglas B. Molyneaux is a Salmon Research Project Leader for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 90, Bethel, AK 99559-0090

Cindy J. Anderson is Kuskokwim Area Catch Monitor for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 90, Bethel, AK 99559-0090

Helen H. Hamner is Regional Herring Coordinator for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599

D. J. Schneiderhan is a Salmon Research Project Leader for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599

Michael W. Coffing is a Resource Specialist for the Alaska Department of Fish and Game, Division of Subsistence, P.O. Box 1788, Bethel, Ak. 99559-1788

Robert J. Walker is a Regional Biometrician for the Alaska Department of Fish and Game, Division of Subsistence, 333 Raspberry Road, Anchorage, Ak. 99518-1599

Karen E. Hyer is the Kuskokwim River Sonar Project Leader for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599

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Yukon Refuge, P.O. Box 33, Delta, Alaska 99501-0033

Delta, Alaska, is a small town located on the Kuskokwim River. It is the only town on the river and is the only town in Alaska that is not on a highway.

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PREFACE

This is the twenty-ninth annual management report detailing the management activities of the Division of Commercial Fisheries staff in the Kuskokwim Area. The 1960-1974 management reports for the "Kuskokwim District" appear in the Arctic-Yukon-Kuskokwim Area report series. The 1975-1986 management reports appear in the Kuskokwim Area Annual Report series. In 1987 the annual management report became part of the Regional Information Report Series.

Data presented in this report supersedes information found in previous management reports. This report includes summary data from many special research projects. Complete documentation of these projects and results appear in separate reports. Some of the data presented is preliminary and may be presented with minor differences in future reports.

Subsistence catch estimates for the years before 1978 are different from the estimates presented in the Kuskokwim Area Annual Management Reports for 1978 through 1984. A reanalysis of the historical data in 1978 resulted in revision of the tables. The method and the reason for the revision was not recorded. In an effort to standardize the subsistence catch data, the estimates originally reported in the Management Reports before 1978 have replaced the 1978 revisions.

To simplify use of this report, the tabular data are separated into current year tables and appendix tables. The appendix tables are by species and fishing district. The appendix tables show annual comparisons and information that seldom change.

"Total fishermen" is the number of unique CFEC permits used in a particular interval. In the past many area fishermen only delivered once or twice during each season. The increasing importance of cash in the area economy has resulted in higher levels of sustained effort throughout the fishing season.

"Total fishermen hours" is the product of the number of unique CFEC permits used in a fishing period multiplied by the total number of hours the district was open to commercial fishing. The catch divided by the resulting number of fishermen hours equals catch per fishermen hour (catch per unit effort or C.P.U.E.).

Computer tabulations of fish tickets provide the commercial catch data presented in this report. The computer software program used to tabulate fish ticket data is the statewide system provided by the Division of Commercial Fisheries Computer Services section. In 1989, 15,562 salmon and 1,656 herring fish tickets were processed by the Kuskokwim area office (Table 1).

PART I. SALMON FISHERY

INTRODUCTION

Area and District Boundaries

The Kuskokwim Area includes all waters of Alaska between Cape Newenham and the Naskonat Peninsula, plus Nunivak and St. Matthew Islands (Figure 1). Commercial salmon fishing occurs in four districts in the area:

District 1 consists of the Kuskokwim River from a line from Apokak Slough to Popokamiut upstream to a line between ADF&G regulatory markers located upstream of the mouth of Bogus Creek (Figure 2). The downstream boundary has been in effect since 1986 and the upstream boundary since 1988.

District 2 consists of the Kuskokwim River from ADF&G regulatory markers located at High Bluffs upstream to the ADF&G regulatory markers located at Chuathbaluk (Figure 3). These boundaries have been used since 1988.

District 4 consists of the waters of Kuskokwim Bay between Oyak Creek and the Arolik River adjacent to the village of Quinhagak (Figure 4). These boundaries have been in effect since 1960.

District 5 consists of the waters of Goodnews Bay (Figure 5). This boundary has been in effect since 1968. These districts correspond to the local geography and distribution of the five species of salmon harvested by the subsistence and commercial fishery.

Fishery Resources

Six species of Pacific salmon are indigenous to the area: chinook or "king" salmon (*Oncorhynchus tshawytscha*), sockeye or "red" salmon (*O. nerka*), coho or "silver" salmon (*O. kisutch*), pink or "humpy" salmon (*O. gorbuscha*), chum or "dog" salmon (*O. keta*), and rainbow trout (*O. mykiss*). The Kuskokwim River drainage has the largest populations of chinook, sockeye, coho and chum salmon in the area. Pink salmon occur throughout the area, but little quantitative data exists on the population size because of the lack of commercial markets and interest by subsistence fishermen. There is no directed commercial fishery for rainbow trout; however this species is important in the subsistence fishery. The directed sport fishery on this species has grown dramatically in recent years.

The management goal for chinook, sockeye, coho, and chum salmon is to achieve desired escapement objectives and allow for the orderly harvest of fish surplus to spawning requirements. Subsistence

fishing receives the highest priority among beneficial uses of the resources.

Management Objective and Projects

Alaska Department of Fish and Game's Division of Commercial Fisheries manages the Kuskokwim Area subsistence and commercial fisheries. The Department's goal is to manage both fisheries on a sustained yield basis within the policies set forth by the Alaska Board of Fisheries. The vast size of the Kuskokwim Area and the turbid nature of many streams make accurate estimates of the size of salmon returns and spawning escapements difficult to obtain. The relative lack of comparative catch data, caused by the expansion of the fisheries since their initiation, hampers management. The need to provide spawning escapements, as well as sufficient harvest to the important subsistence fishery complicates management of the commercial fisheries.

Escapement Monitoring

Before 1983, a management strategy of conservatively increasing the level of commercial catch to establish definite trends between catch and escapement allowed development of the fishery. In 1983 the area's escapement data base allowed the assignment of provisional salmon spawning escapement objectives in major spawning systems. These objectives were averages of aerial survey, tower, weir, and sonar indices obtained in these systems since 1960 under good to fair conditions (Appendix A-1). Poor indices, primarily caused by turbid water or incomplete counts, were not part of the average. Unusually large chum salmon surveys from the Tuluksak River and Kanektok River data bases were not used in the index calculations because of their disproportionate effect. Attainment of escapement objectives should maintain salmon runs at recent historic levels. Future adjustment of objectives may be required to optimize salmon production. Improvement of the escapement assessment program continues to be a priority.

Timely escapement estimates for in-season management are difficult to obtain since most spawning streams are many miles upstream of the commercial fishing districts. A weir on the Kogrukluk River, sonar counter in the Aniak River, and a counting tower on the Goodnews River provide more accurate estimates of escapement and allow calibration of some aerial surveys. In recent years, salmon migratory timing data bases have become extensive enough to aid in-season management by allowing predicative modeling of the escapement at these projects. In-season management still depends heavily on commercial catch data and the test fisheries.

The Eek test fishery, main river sonar and subsistence test fishery are being developed to assess in-season run strength. The Eek test

fishery, located near the mouth of Kuskokwim River, contributes the most to in-season management. The Working Group directs, and Kemp-Paulucci Seafoods and the Department sponsor the Eek test fishery. Although limited by inconsistencies and logistics problems, the Eek test fishery has been useful for making in-season management decisions. It provides an earlier assessment of run strength than the Department test fishery near Bethel increasing reaction time to changes in run strength.

A three-year study to determine the feasibility of using dual-beam sonar to count salmon migrating up the Kuskokwim River began in 1988. Facilities were constructed at a site with characteristics favorable to the use of hydroacoustic gear. Transducers were deployed on both banks of the river in 1988 and 1989. A vertically aimed transducer sampled a lateral transect between 4 June and 22 August 1988 to discover fish spatial distribution. The spatial distribution of fish occurred throughout the water column with most tending to travel near the bank and the surface. Fish were detected in one slough area on the left side of the river, but species identification was not possible. There was no correlation between sonar counts and gill net abundance indices. Partial explanation may be the differences in area sampled between the two gear types and in the selectivity of gill nets for salmon-size fish. Equipment problems hampered research operations in 1988. Resolution of these problems in 1989 allowed determination of fish target strength for possible use in allocation of sonar counts to species (Hyer 1990).

The escapement objective for the Goodnews Tower sockeye salmon was lowered in 1989 from 35,000 - 40,000 to 20,000 - 30,000. The reduction was based on a five year data base. However, the exploitation rate for sockeye salmon, the target species, appeared to be low (Appendix D.3). The neighboring Togiak District sockeye salmon runs support a 20 year average exploitation rate of 52 to 61 percent (Bill 1988). Further refinements are expected as the spawner recruit relationships develop. The present adjustment will allow an increased harvest without jeopardizing the sockeye salmon run.

The change from a harvest-guideline-based management strategy to an escapement-objective-based strategy in 1983 appears to be increasing the average harvest (Table A.3). However, is too early to determine if the escapement-based management strategy will provide a long term increase in production in the Kuskokwim Area.

Subsistence Fishery

Subsistence needs are the priority use of the Kuskokwim Area salmon resources. The Kuskokwim Area subsistence salmon fishery is one of the largest and most important in the state, with over 1,300 families participating. Subsistence catches of chinook salmon in

the Kuskokwim River often exceed the commercial catch of this species (Table B.18).

Harvest Surveys

The Division of Commercial Fisheries began annual subsistence salmon harvest surveys of Kuskokwim River communities in 1960, of Quinhagak in 1967, and the Goodnews Bay District in 1979. In 1988 the Division of Subsistence took over the annual surveys under a memorandum of agreement with the Commercial Fisheries Division. The project goals are:

1. To obtain estimates of the subsistence salmon catch, by species, for 32 Kuskokwim Area communities.
2. To achieve a total (expanded) harvest estimate for subsistence-caught salmon by species for the Kuskokwim Area.
3. To identify issues affecting subsistence.
4. To update community household lists and identify fishing households in Kuskokwim Area communities.

This is the first year the surveys were conducted in October and November. The two divisions determined that the later survey timing was necessary to get more complete catch data, particularly on coho salmon.

Commercial Fishery

The commercial fishery has expanded during the last ten years. This expansion is due to increased participation by individual fishermen and improvements in fishing gear, tendering, and processing capabilities. In 1989, a record 824 of the 832 permit holders made at least one landing (Table 5). Permit holders transfer freely between districts. Restriction of fishing time and gear restrictions have offset increases in fishing effort and efficiency so that adequate subsistence harvests and average spawning escapements occur.

Harvest Strategies

Adjustments of the number and duration of commercial fishing periods and time intervals between periods are the primary methods of distributing the harvest throughout the run. This avoids over-harvesting discrete stocks and allows harvests to remain within guidelines, achievement of escapement objectives, and

sufficient fishing time for the subsistence fishery. Commercial fishing periods vary between 6 and 12 hours in length depending on the species, effort, and return magnitude.

Communicating management plans and decisions to the public is always difficult. Many of the people in the Kuskokwim Area cannot read or speak English. More often English is a second language, which increases the challenge of communicating management plans and decisions. Many special regulation notices were broadcast over local radio stations and over VHF and CB radio in English and Yup'ik languages.

A weekly English language fishery program is broadcast over radio station KYUK in Bethel. The program provides information on regulations, biology, and fisheries management throughout the year.

Salmon Disease

On 23 June, a subsistence fishermen brought us a chinook salmon, from the Kuskokwim River, with nodules in the muscle. The fishermen's concern was the nodules might be a health hazard. We submitted samples to the Fish Pathology Section. The fungus; Ichthyophonus hoferi, caused the nodules. This fungus has a cosmopolitan distribution in fish and is not a human health hazard (Sullivan 1989).

SUBSISTENCE FISHERY

Regulations

All waters of the Kuskokwim Area are open to subsistence fishing. Only residents of Alaska domiciled in the Kuskokwim Area may take salmon in the Kuskokwim Area for subsistence. Except those persons residing on the United States' military installations located on Cape Newenham, Sparrevohn and Tatalina, who may not take salmon for subsistence. Only gill net, beach seine, or fish wheel may be used to take subsistence salmon. Except in the Holitna River drainage, where spears are also legal gear. The total length of set or drift gill nets in use may not exceed 50 fathoms. Gill nets with six inch or smaller mesh may not be more than 45 meshes in depth. Gill nets with greater than six inch mesh may not be more than 35 meshes in depth. There are no permits required for subsistence fishing in the Kuskokwim Area (ADF&G 1988).

Except in commercial salmon fishing districts, the subsistence fishery is subject to very few restrictions in order to give preference to subsistence users. Some restrictions are necessary to deter illegal commercial fishing and ensure adequate escapement. Because most subsistence fishermen also fish commercially, there is a temptation for fishermen to sell fish caught during commercial

closures. The subsistence fishery closes before, during, and following commercial periods to discourage the sale of subsistence fish.

In the Middle Kuskokwim (District 2), Quinhagak (District 4), and Goodnews Bay (District 5), the subsistence fishery closes in the spawning tributaries before, during and after commercial periods to discourage illegal commercial fishing. In the Lower Kuskokwim (District 1) only the commercial fishing district and Kuskokuak Slough close, while the spawning tributaries remain open (ADF&G 1988). There is substantially more time for subsistence fishing than commercial fishing in all areas. For example, during the 1989 fishing season in District 1, fishermen could subsistence fish for 82 days while there were 21 days with commercial fishing periods.

Beginning in 1988, the District 1 subsistence closure included the main stem of the Kuskokwim River between Districts 1 and 2. The inclusion of the Kuskokwim River between Districts 1 and 2 in the subsistence closure appeared to be a very successful regulation change. Before enactment of this regulation only 1 to 3 boats were observed fishing in this area during subsistence fishing periods. Preceding and during commercial openings, when this area remained open to subsistence fishing, the effort would increase to as many as 20 boats. The public reported that the effort increased because the fishermen were transferring their catch to permit holders who would sell the fish. Closing this area appeared to solve the problem since only 3 closed water citations were issued there and few fishermen reported anyone fishing during the closure.

District 1 above Bethel was not open to commercial fishing during the first two commercial openings; 19 and 23 June. The entire area from Popokamiut to High Bluffs closed to subsistence fishing (Figure 2). Kwethluk residents asked that commercial fishing be opened in the entire district. If that was not done, then they wanted subsistence fishing to remain open in Kuskokuak Slough, when commercial fishing is restricted to below Bethel.

Subsistence Salmon Harvest Surveys

The Alaska Fish and Game statute requires that fishery resources be "conserved in a manner consistent with the sustained-yield principle" (Alaska Statute Title 16). State Law also requires that the highest priority go to subsistence uses as long as sustained yield of the resource is provided (ch. 52, SLA 1986). Besides mandating the conservation of fisheries, the state is also charged with their commercial development. These legal measures provide the framework for the allocation of fishery resources, such as Kuskokwim River salmon, among subsistence and commercial uses.

Management of the Kuskokwim Area salmon fisheries requires a determination of the allowable harvest consistent with maintaining

sustained-yield of salmon stocks. After determining the necessary escapement levels, excess salmon can be allocated among different users. The number of salmon necessary for subsistence are considered first. Subsistence use of Kuskokwim Area salmon stocks is significant so, conserving, managing, and allocating salmon in the Kuskokwim Area requires reliable data on subsistence salmon harvests.

During the early years, the Department did smokehouse counts to determine total utilization of subsistence caught fish. In an effort to determine additional timing and magnitude data, the Department began using subsistence catch forms in 1962. In 1966 the Department started using subsistence catch calendars to help determine subsistence salmon harvest levels on the Kuskokwim River. These calendars were picked up during the annual surveys of smokehouses, drying racks, caches, and personal interviews conducted in July and August. Since 1969, subsistence fishermen have been asked to mail their filled-out catch calendar to the department. Most calendars continued to be collected during the July and August surveys by department personnel. For the past several years, calendars on which to record daily subsistence salmon catches have been sent to known subsistence fishing families when the river ice breaks up each spring. These calendars are postpaid for return when completed.

Harvest estimates were derived using subsistence salmon catch calendars and household interviews with "fishing families." Subsistence fishing is often not an individual effort, but the activity of extended family groups. The group, or "fishing family" normally related by kinship ties; cooperates during the summer in the harvesting, cutting, drying, smoking, and storing of salmon. The fishing family often includes a commercial fisheries limited entry permit holder who fishes for both commercial and subsistence purposes.

Although information is available for 1960-1988, the expansion method used in these years was not fully documented. The expanded subsistence harvest information was presented in tabular form. This included estimates for those families known to have fished, but for one reason or another not seen. These families were assigned the average catch for other fishing families in that particular village .

In several years, funds were not available for the complete documentation of subsistence harvests. Efforts were made to collect as much data as possible using existing staff and funds. Subsets of villages were sampled during these years, and expansion to other communities in the area were made.

Residents of 26 communities within the Kuskokwim River drainage harvest salmon for subsistence uses (Figure 1). These communities consist of approximately 2,700 households, many of which fish for

salmon for subsistence purposes. Outside of the drainage, residents of six Kuskokwim Bay communities (Platinum, Goodnews Bay, Quinhagak, Kongiganak, Kwigillingok, and Kipnuk) use Kuskokwim area salmon stocks (Figure 1). These communities have about 400 households combined. In addition, residents of Mekoryuk, Tununak, Toksook Bay, Newtok, Chefnak and Nightmute may harvest salmon bound for the Kuskokwim Area drainages (Figure 1). An additional 300 households live in these communities. All six species of salmon are harvested for subsistence use. The survey only collects data on the five migratory species, chinook, sockeye, coho, pink, and chum salmon.

The objectives of the 1989 subsistence salmon harvest survey were:

- 1) to develop and carry out a revised harvest reporting and estimation procedure for determining harvest levels by species by community;
- 2) to update community household lists and identify fishing households;
- 3) to evaluate the precision and accuracy of the estimated harvest;
- 4) to compile information on fishing effort, gear types, participation rates, and timing of the subsistence harvest;
- 5) to identify salmon harvest issues;

Recording Subsistence Salmon Harvests, 1989

In 1989, a new method to improve harvest reporting and the estimation of the total harvest was used. Simply by having a more accurate count of the number of households participating in the fishery improved the total harvest estimate. A fishing family represented at least one household unit, but more sometimes. In addition, 94 fishing families live in the Kuskokwim Bay communities of Quinhagak, Goodnews Bay, and Platinum, and 102 fishing families live in the Nunivak and Nelson Island communities of Mekoryuk, Tununak, Toksook Bay, Newtok, and Nightmute. Residents of these communities are predominantly Alaskan Native. The total number of households was previously undocumented.

The study sought data on subsistence harvests from each household rather than a sample of "fishing families." The goal of recording harvests of all households, whether or not they were included on previous lists of "fishing families," was a departure from the method used in previous surveys (since 1960). Before 1989, subsistence salmon harvest studies had attempted to sample community households by recording harvests only of families

identified as fishing families. This measure attempted to include the harvests of all households within the fishing family group. The dynamics of participation in salmon fishing show that often there are households in a community that do not fish for one or several seasons, but subsequently begin to fish; whereas other households no longer fish. This was often a result of changes in household composition, such as the household becoming smaller when younger members marry and form new households.

Many sources were used to supplement community household lists available at the end of the 1988 fishing season. Data from these sources included:

- 1) household census lists from the Alaska Department of Community and Regional Affairs for 1985-88 (information was not available for all communities for all years);
- 2) the names of 1987 commercial fishing permit holders in Bethel and McGrath;
- 3) the names of 1988 sport licenses holders in Bethel and McGrath;
- 4) the names of people in the 1988 phone books for Bethel and McGrath.

Except for residents of Bethel or McGrath, subsistence salmon harvest calendars were sent to all households in Kuskokwim Area communities identified at the end of the 1988 fishing season. Bethel and McGrath households were sent a postcard survey before the 1989 fishing season (Appendix 1). This survey asked if the recipient planned to fish for subsistence salmon during the coming year. If the respondent replied "yes" a calendar was mailed.

The harvest calendar itself changed to improve data collection. Three similar, but unique, harvest calendars for the lower and upper Kuskokwim River, and Kuskokwim Bay were sent to the appropriate villages (Appendix 2). Each calendar was designed for recording the harvest of each species on a daily basis. The calendars had three major modifications. First, only species which occurred in the drainage segment appeared on the calendar. Second, species were identified by both their common name and the term used by local residents as these varied within the drainage. Third, the revised calendar included only those months during which people fished for salmon in each section of the drainage. For example, May through September along the lower river and June through October along the upper river. These changes were not only intended to improve accuracy of reporting, but also to simplify the entry of data into computer files. The harvest calendar was the only method that provided timing of harvest by species on a daily and monthly basis.

Approximately 1,750 calendars were distributed. Where addresses were available, the calendars were mailed to post office boxes; otherwise calendars were sent general delivery for the post office clerk to distribute. Each calendar had a postage paid stamping for return to the Bethel office of the Department of Fish and Game. A third component in the data collection was the postseason field survey. Following the fishing season, field workers went to each of the communities to pick up harvest calendars and administer a short questionnaire to each household. The questionnaire (Appendix 3) served to collect harvest information if the salmon harvest calendar had not been used or was partially used, and also to record information on fishing gear used, household size, other households in a fishing group, number of dogs fed salmon, and number of salmon fed to dogs. Comments on salmon runs, fishing conditions, and regulations were also requested. Similar to the subsistence salmon harvest calendars, slightly different versions of the survey instrument were used in the different sections of the drainage.

Thirty eight communities were targeted for post-season community surveys (Table 2). Bethel, Telida, and the Nelson Island communities (Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak) were not selected for household surveys. Kipnuk and Kongiganak declined to participate in the postseason survey project. Six Division of Subsistence staff and two seasonal employees of the Division of Commercial Fisheries were assigned to conduct surveys in the targeted communities.

Before beginning the community surveys, efforts were made to inform and prepare fishermen for the arrival of survey crews. This was done weeks or days before their arrival through radio announcements, posters in public buildings, letters and phone calls to city offices.

Survey work was conducted systematically. One or two researchers conducted the survey in each community. Upon arrival in a community, field researchers checked in with the city office to introduce themselves and outline their task. Knowledgeable people within the community were identified to help in the compilation and verification of the pre-season household list. These people helped to identify households that fished for subsistence salmon in 1989. Field researchers attempted to contact all identified fishing households. Structured interviews conducted with these households by using the survey instruments and subsistence salmon harvest calendars were collected. If time permitted, other households on the community list were seen about their salmon fishing activities. A typical community visit lasted 1-2 days. During the village visits the preseason inventory of households was updated.

The fourth important and additional source of harvest data for the 1989 fishing season was from postseason postcard and phone surveys (Appendix 4). The postcard survey simply asked if the household

fished for subsistence salmon, and the quantities harvested of each of the salmon species. The postcard could be separated in half, and returned postage prepaid. Generally the postcard survey was mailed to households that had not returned a subsistence salmon harvest calendar or had not been seen during the postseason community visit. Kipnuk, Kongiganak, Telida, Mekoryuk, Newtok, Nightmute, Toksook Bay and Tununak were not visited, all households in these communities received the survey in the mail in October. Bethel households also received postcard surveys. A phone survey contacted nonresponding Bethel households during November. The phone survey asked the same questions as the postcard survey.

Subsistence Salmon Harvest Estimation

Information from the three information sources (calendars, surveys, postcards) was entered into a microcomputer database. Data were verified against source documents, and several logic checks of the data were made. The master list of names and addresses of resident households was updated to reflect changes in household composition and number of households residing in each community. The unique household numbering system was maintained on the master list and on the database tables containing information from each of the three information sources.

In order to provide a single best estimate for a household's harvest of a salmon species during 1989, information was compiled from the various information sources. This process, conducted by a single researcher, ensured data consistency. Usually, there were few discrepancies between the information available from the different sources. In cases where a household survey was conducted and showed that the household fished for salmon, but no salmon harvest could be quantified through any information source, the harvest was identified as "missing." Households were also identified as "usually fish" or "usually do not fish."

Guidelines developed during the course of the process to composite harvest information included:

- 1) the assumption that the salmon harvest calendar would be the best means of recording household harvest;
- 2) information from the various sources for different species needs to be evaluated concurrently in order to identify the harvest for each species;
- 3) information from the various sources for a particular species may be different due to the timing of its collection;

- 4) information on the use of salmon to feed dogs should be used as a minimum estimate of the household's harvest if no other information is available.

Salmon harvests identified as "removed from the commercial catch" were included in a household's subsistence harvest.

The average community catch (C_k) of fishing households was estimated for salmon species from the composite catch per household data. Mean community catch (C_k) was estimated by

$$C_k = \sum_{i=0}^1 (N_{ki} * C_{ki}) / \sum_{i=0}^1 N_{ki}$$

where

k = community

i = indicates whether the group usually fishes (1) or does not usually fish (0)

N_{ki} = number of families that usually fish/usually do not fish

C_{ki} = mean harvest for families that usually fish/usually do not fish

The total community catch (T_k) was estimated by

$$T_k = \sum_{i=0}^1 (N_{ki} * C_{ki})$$

and its variance (V_k) includes a finite population correction factor

$$V_k = \sum_{i=0}^1 ((N_{ki}^2) (1 - (n_{ki} / N_{ki})) (s_{ki}^2 / n_{ki}))$$

where

n_{ki} = number of families for which information is available that usually fish/usually do not fish

s_{ki}^2 = variance for the amount harvested for the usually fish/usually do not fish groups.

Community catch estimates and their variances were summed across communities for river section subtotals and across all river sections for drainage totals. Total estimates for community, district, fishing area and total drainage harvests are reported with approximately 95% confidence intervals (two standard errors of the totals).

Sampling Summary

Table 2 presents data on the number of households contacted using the three means of data collection. Over 3,400 households in communities located in the Kuskokwim area are defined in the

microcomputer database. Subsistence salmon fishing information was collected for over 72% of these households. The majority of contacts (969) were made through field surveys, although 630 Bethel households were contacted during phone interviews. Of the contacted households, 1,527 (61.6%) fished for subsistence salmon in 1989.

Approximately 15% (267) of the estimated 1,750 subsistence salmon calendars which were mailed pre-season were used and returned. Twenty-two percent of the post-season postcards were returned.

Nearly 1,300 households have been classified as "usually fish." Salmon harvest information was collected from 98% of these households. Eighty-nine percent of these households fished for subsistence salmon in 1989.

Over 2,100 households were classified as "usually do not fish" for subsistence salmon. Information was collected from 57% of these households of which only 18% fished for salmon in 1989. Over half of the households which usually do not fish reside in Bethel.

Harvest Summary

The 1989 information collection effort significantly increased the number of households that were known to have subsistence fished for salmon. In 1989 over 1,500 households were determined to have fished. The previous high was in 1988 when 969 families fished. The greatest increase in the number of reported fishing households occurred in communities along the lower Kuskokwim River, where there was a 400 household increase, primarily due to the number of Bethel households found to have fished.

Sample information and harvest estimates by community and fishing area are presented in Table 2. The 1989 subsistence harvest estimates for the Kuskokwim Area are 77,030 chinook, 33,958 sockeye, 49,988 coho, and 132,858 chum. Reported harvests account for 78% of the estimated chinook, 81% of the sockeye, 76% of the coho, and 78% of the chum salmon harvests.

Households in the lower Kuskokwim River harvested 81% of the estimated subsistence chinook, 61% of the sockeye, 60% of the coho, and 69% of the chum salmon catches. About two-thirds (68%) of the identified fishing households reside in this area.

In the lower Kuskokwim River 91% (418 of 458) of the households used drift gill nets. Drift gill nets are the preferred gear in the Middle Kuskokwim (76%) and Kuskokwim Bay (73%). In the upper Kuskokwim River 61% of the households use set gill nets. In addition to gill nets, salmon were taken with seines, rod and reel, and fishwheels.

COMMERCIAL FISHERY

Commercial fishing periods are by emergency order in all four of the Kuskokwim districts. Only set and drift gill nets with six-inch or less mesh may be used for commercial salmon fishing. The nets may not exceed 50 fathoms in length or 45 meshes in depth (ADF&G 1988).

The total 1989 Kuskokwim Area commercial salmon catches (District 1, 2, 4 and 5) consisted of 67,003 chinook, 82,874 sockeye, 556,312 coho, 819 pink and 802,199 chum salmon (Table 3). The total amount paid to fishermen was \$5,194,025 (excluding bonuses and other incentives, Table 4). In 1989 the average Kuskokwim permit holder earned \$6,303 (Table A.2.). Prices for all species except sockeye salmon were below the previous five year average (Table A.8). The average price of \$0.75 a pound for chinook salmon was the lowest since 1985. Sockeye salmon at \$1.20 per pound were 22 cents less than in 1988 but still 29 cents above average. The average price per pound for coho salmon of \$0.55 was the lowest price since 1985. The chum and pink salmon prices were both three cents a pound below the previous five year average price.

A record 824 of the 832 permits fished in 1989 (Appendix A.2.) Residents of the Kuskokwim Area owned 99 percent of the 824 salmon entry permits renewed in 1989 (Table 5). Other Alaskan residents owned eight permits while nonresidents only owned 2 permits (Table 5).

Enforcement

The Working Group and other members of the public continued to express their concern over the growing enforcement problems in the commercial salmon fishery. Fishing before and after fishing periods, fishing in closed waters, and fishing without a permit are the areas of greatest concern. There were 26 citations for commercial fishing in closed waters. Eight citations for commercial fishing without a crewmember's license made this the second most common violation. Fishing without an entry permit was the third most common violation with 5 offenders. Four unlicensed crew members were employed illegally. Four people subsistence fished during commercial periods. While it is still too early to draw a firm conclusion, it appears that the recent change in the law allowing most enforcement problems to be treated as violations is resulting in improved enforcement and compliance. The Department of Public Safety stationed the detachment commander in Bethel beginning in July of 1989.

Kuskokwim River

The Kuskokwim River Salmon Management Plan, 5AAC 07.365, along with other regulations and policies promulgated by the Board of

Fisheries provide the framework for management of the Kuskokwim River commercial salmon fishery (ADF&G 1988). Fishing periods in District 1 and 2 are usually six hours in duration, from 1:00 p.m. until 7:00 p.m. The hours were new in 1988. The local advisory committees requested this six hour period to maximize the daylight preceding and following the commercial periods. This reduced the opportunity for illegal fishing before and after openings under the cover of darkness. If the fishing periods are longer, the extra time is divided equally before 1:00 p.m. and after 7:00 p.m. (ADF&G 1988).

Salmon may not be taken in waters of the Kuskokwim River drainage that are not included in Districts 1 or 2. Commercial fishing is prohibited in Kuskokuak Slough (ADF&G 1988).

The Kuskokwim River Salmon Management Working Group, composed of representatives of the Kuskokwim River salmon users, mandated in The Joint Statement on the Management of the Kuskokwim River Salmon Fishery (ADF&G 1988) has improved management. The 1989 season was the second year in which the Department and the Working Group cooperated in managing the Kuskokwim River fishery. During the course of the season the Working Group met 27 times to evaluate the status of the salmon runs and make recommendations to the Department about commercial fishing periods. The Working Group set most fishing periods individually. This allowed them to consider any unexpected changes in run strength. This strategy provided an excellent harvest and escapement in most systems.

The Working Group recommended on 8 June that the first fishing period be in District 1, downstream of Bethel (Stat. Area 335-11, Figure 2) on 19 June (Table 7). The lack of data on which to base a decision concerned the Working Group. The policy statement, adopted by the Board of Fisheries in 1987, requires announcement of the first period by 10 June (ADF&G 1989a). The high water caused subsistence fishing to start late, since people could not put in their fish camps. To provide for an adequate subsistence fishing opportunity the Working Group recommended 19 June as the opening date.

Only 374 fishermen participated in the first opening (Table 7), normally 575 to 600 boats participate in the first period. A fishermen's strike for higher prices caused the drop in effort. Several members of the public requested that the Working Group support the strike by not recommending any openings. After discussing the request, the Group decided to base management on run strength and not on fish prices. The peak of the chinook salmon run appeared to be past Bethel but still in District 1 based on the test fisheries. There were low numbers of chum salmon in the upper half of District 1, as shown by the subsistence catch reports. The chum salmon run appeared very strong in the lower half of District 1 based on test fisheries and the commercial opening. Effort would possibly return to normal if the strike was

settled. The group recommended that only District 1 downstream of Bethel open to commercial fishing for the second period to allow chum salmon harvest while protecting chinook salmon that were in the upper half of the district.

The 8 hour fishing periods continued and so did the strike. Effort continued to drop until on 26 June only 126 boats fished in spite of the entire district being open for the first time (Table 7). On 30 June, effort increased to 642 boats with the end of the strike. It is difficult to judge the effect of the strike without a total run estimate. By comparing the 1989 commercial catches with years that had similar test fishing indices (test fishing continued normally), an estimated 10,000 to 12,000 chinook salmon and 5,000 sockeye salmon escaped because of the strike. Chinook salmon achieved escapement objectives in most systems for the second year in a row (Figure 6). Chinook salmon escapement indices were not unusually high, which shows that the strike did not increase escapement (Figure 6). There are no escapement objectives for sockeye salmon in the Kuskokwim River.

During the following week the consensus reached by the Working Group called for a somewhat shorter interval between fishing periods than the Department's recommendation. The later escapement counts in index streams indicated that this strategy allowed full utilization of chum salmon while still achieving the escapement objectives. Fishing continued until 18 July when the Working Group recommended that fishing be suspended for 9 days. Reasons for the suspension included decreasing chum salmon abundance, deterioration of fish quality, uncertain lower river tributary escapements, and low abundance of coho salmon.

District 2 opened for the first time on 30 June coincidental with the strike settlement (Table 8). Subsistence catch reports indicated that chum salmon were the dominant species and that most people had completed their subsistence chinook fishing in District 2. The first fishing period on 30 June took the entire harvest guideline and was the largest single chum salmon period ever recorded in District 2 (Table B.16). The above average magnitude of the run indicated that an increased harvest was allowable even though the 1989 catch in District 2 was a higher percentage of the total than normal. This was a result of the reduced effort in District 1 during the strike. This special circumstance was also a reason for exceeding the harvest guideline. There were 3 later fishing periods coincidental with the fishing periods in District 1 on 3, 5, and 11 July. The Working Group recommended that only District 1 open on 8 July. This recommendation followed testimony by representatives from District 2 and members of the public that the commercial fishery was preventing subsistence fishermen from getting the necessary number of fish. The season closed on 11 July when the harvest guideline had been exceeded and fish quality was not acceptable to the processors.

District 1 reopened on 27 July for coho salmon. The catch of 5,651 coho salmon was the smallest for an opening period since 1975 (Appendix B.12.). The chum salmon catch of 5,716 exceeded the coho catch (Table 7). Concern for run strength resulted in the Working Group recommending the next period for 3 August. Fishing periods occurred every three days during early August. The catch and the test fisheries suggested that the run was strong, however an uncharacteristic drop in both the commercial and test fishery catches occurred on August 15 and 18 (Table 7). Fortunately the Working Group insisted on continuing the one period at a time strategy in spite of a Department suggestion to set two periods. This allowed a closure following the unusually low catch of 5,938 coho on 18 August (Table 7). Test fishing results at the mouth of the river started improving the following day and by 21 August the test fishery at Bethel also showed improvement. The Working Group recommended a period on 23 August to allow fish to distribute themselves throughout the district. That catch was typical for that stage of the run and the season continued normally to the regulation closure on 1 September.

Chinook Salmon

The Board stated in 5 AAC. 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN that there be no directed commercial harvest of chinook salmon (ADF&G 1988A). This was done to provide for a subsistence harvest that has averaged 54,000 (Table B.18.) and to maintain average spawning escapements. This action in 1987 followed earlier attempts to correct the declining escapements of Kuskokwim River chinook salmon.

Beginning in 1985, the commercial fishery used gill nets of 6-inch or smaller mesh size. This action, taken to reduce the harvest of the larger female chinook salmon, did not stop the decline in total escapement in 1985 and 1986 (Figure 6). The six-inch mesh restriction may result in an improvement in quality of the escapement by increasing the number of females. However, the average sex ratio for an equal number of years before and after the gear change in 1985 is 32 and 31 percent female (Appendix B.19). The percentage of females with gill net marks increased from 10 to 17 percent since the gear change (Appendix B.19). The commercial catch is showing an increase in the number of males and a decrease in the number of females. From 1982-1984 while using large mesh gear the commercial catch was 35 to 40 percent female. During the similar 1985-1987 period with the gear restrictions the commercial catch was 23 to 35 percent female. The number of years of data is too small to provide a significant comparison but the trend appears promising.

In 1987 the fishery management plan adopted by the Board of Fisheries was a result of negotiations between the Department and the affected users. This plan required:

- 1) the fishery to open on 18 June;
- 2) that there be three eight hour fishing periods in June on 18, 24, and 30 June;
- 3) that the opening on 18 June be restricted to District 1 downstream of Bethel;
- 4) that a maximum of 14,000 chinook salmon could be sold incidentally to the commercial chum salmon fishery;

The 1987 strategy resulted in chinook salmon approaching their escapement objectives in the Kuskokwim River for the first time since 1981 (Figure 6). Dissatisfaction with the inflexible plan resulted in a new management plan in 1988. The Joint Statement on the Management of the Kuskokwim River Salmon Fishery was a new policy in 1988 adopted to address these concerns (ADF&G 1988).

During the 1989 season the United States Fish and Wildlife Service, the Working Group, and the Department cooperated in a pilot chinook salmon tagging study. From 7 June through 12 July; 320 chinook salmon were tagged in District 1. The results are still being evaluated. The migration rates recorded were similar; 0.25 to 34.0 river miles a day as found in previous studies (Appendix B.20.).

The incidental chinook salmon catch was 43,217 in 1989, well above the average of 36,188 (Appendix B.5.). For the second time since 1981 chinook salmon reached escapement objectives in most index streams (Figure 6). An increase in the run size over recent years contributed to the improvement in catch and escapement (Appendix B.13). The Kwethluk River is one of several lower Kuskokwim spawning tributaries that have not achieved escapement objectives in recent years in spite of the drainagewide index reaching objective level. The Kwethluk River reached its objective of 1,000 chinook for the first time since 1979 (Table 6). It is not possible to determine if this was a result of the strike or unusually successful survival in that stock of chinook salmon.

Sockeye Salmon

The sockeye salmon catch is incidental to the chum salmon fishery in the Kuskokwim River Districts. Before 1981, sockeye and chum salmon in commercial or subsistence catches were not accurately identified in the Kuskokwim River. For this reason, the true accounting of the sockeye and chum salmon harvest in the main Kuskokwim River is not known. Fishermen, processors, and the Department have worked since 1981 to identify each species accurately in the commercial harvest. Sockeye salmon have comprised 5 to 24 percent of the chum-sockeye salmon catch since 1981. Before 1981, the reported sockeye salmon catch was less than 2 percent of the chum-sockeye salmon catch (Appendix B.5). The

limited sockeye salmon database and interviews with lifelong residents of the drainage suggest that the recent increase in catch is not all due to the improved reporting. The size of the sockeye salmon return seems to have increased in recent years.

The 1989 catch of 43,000 was much lower than the previous 5 year average of 95,856 sockeye salmon (Appendix B.5.). The strike had an impact on the sockeye catch but test fishing results and commercial catches showed that the run was much smaller than in recent years. Sockeye salmon management is incidental to other species in the Kuskokwim River and there are no escapement objectives.

Chum Salmon

The chum salmon catch of 749,182 fish was the second largest on record for the Kuskokwim River (Table B.5). This was the second year in a row that Kuskokwim River chum salmon achieved the escapement objectives and supported exceptional catches (Table A.4). In District 2, the chum salmon harvest of 20,946 was the largest on record, exceeding the 4,000 to 8,000 harvest guideline (B.16).

Coho Salmon

The total coho salmon catch of 479,856 was below the previous 5 year average of 508,561 (Table B.5). Since 1979 - 80 the even year coho salmon runs have been larger than the odd year runs. The 1989 catch was the largest odd year catch in the history of the fishery (Table B.5). It's below average because the record years of 1984 and 1986 raise the average. Unusually high water washed out the Kogrukluuk River weir, the only coho salmon escapement project in the Kuskokwim River drainage, after 3 days of operation. The test fisheries and commercial catch per unit effort in District 2 suggest that escapement levels were normal (Figure 7).

Pink Salmon

The pink salmon harvest is incidental to the chum and coho salmon fishery in the Kuskokwim River. Pink salmon have a strong odd - even year cycle in the Kuskokwim River and 464 pink salmon is a normal odd year catch (Appendix B.5.). The Department does not monitor pink salmon escapement in the Kuskokwim River.

Roe Sales

The 1989 season was the first year that a processor registered to buy only salmon roe in the Kuskokwim Area. Roe sales began on 19

June and continued until 9 August in the Kuskokwim River districts. Twenty-seven permit holders made 63 deliveries totaling 5,578 pounds of roe. Of these permit holders; 7 represent catcher sellers, 6 of who sold their eggs in bulk to a local processor. Fish tickets for the roe do not represent individual permits so the total number of deliveries is not accurate. Catcher sellers sold roe from all species, whereas except for one coho roe sale, all other roe came from chum salmon. Commercial roe prices ranged from \$3.50 to \$4.00 a pound for a total ex-vessel value of \$22,166.

In previous years, all roe sales were between processors and catcher sellers. The catcher sellers' fish tickets already accounted for their fish and there was no need to convert their roe sales into fish. In 1989 all processors refused stripped salmon. Therefore, in order to account for the number of salmon the roe sales represented, the sex ratio of the commercial catch, combined with the average weight of roe per female provided an estimate of how many female salmon were stripped for egg sales. The commercial catch of each permit that sold roe included the estimated number of females. This resulted in an estimated 8,443 chum and 528 coho salmon having only their roe sold. Only one commercial roe fishermen did not deliver the males to another processor.

These 8,971 carcasses may have been used for subsistence purposes. There were several reports of "dumped" fish made to the Department and the Working Group. In response, the Working Group sent a letter to the villages informing them of what was happening. The letter also encouraged people participating in roe sales not to waste the fish and that the sale of roe from subsistence caught fish was illegal. The Department issued two separate news releases in response to public inquiries about selling subsistence caught roe. These news releases explained that subsistence roe sales were illegal.

Commercial roe sales will very likely continue to grow in the Kuskokwim area. It will become increasingly difficult to monitor this fishery because the carcasses are not part of the commercial fishery. Illegal roe sales from subsistence caught fish also may become a problem.

Quinhagak, District 4, All Salmon Species

District 4 opened on 15 June in compliance with 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN that requires an opening before 16 June (ADF&G 1988). Later periods coincided with openings in the other districts whenever possible. Coincidental openings were successful in limiting large scale effort transfers (Appendix A.11.). No other districts were open on 15 June and effort in District 4 was 140 boats, the highest of the season (Table 9). Effort was less than 100 boats in most periods (Table 9).

Maintaining coincidental openings in Districts 2, 4, and 5 was sometimes difficult because of the difference in the length of the subsistence closures. District 1 has a 16 hour closure before each period while the other districts have 24 hour closures. Periods in the other districts had to be announced before the Department decided the next period in the river. If the announcement was delayed to insure a coincidental opening then an emergency order shortening the subsistence closure was issued. Fish and Wildlife Protection and the District Attorney's office informed us that this creates enforcement problems since subsistence fishing times are not normally subject to emergency orders.

There is no in-season measure of escapement in District 4; therefore historic commercial catch levels are the basis for management. Chinook salmon catches were normal so fishing time remained on the normal two 12 hour periods per week schedule. The total chinook catch in District 4 was 20,820 in 1989, which was below the previous 5 year average of 25,400 (Appendix C.7.). Chinook salmon were the most valuable species in the district producing \$301,791 for the fishermen (Table 4). The aerial survey index of 7,900 chinook salmon exceeded the escapement objective of 5,800 (Table 6).

On 30 June sockeye salmon outnumbered chinook salmon and sockeye salmon management began per 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN (ADF&G 1988). Sockeye salmon catches were average and fishing time increased to the normal three 12 hour periods per week in early July (Appendix C.5.). Catches soon dropped below average. Following the period on 12 July fishing occurred twice per week for the remainder of July in response to below average catches. Aerial surveys of the Kanektok River found 15,000 sockeye salmon, only half of the objective of 32,000 (Table 6). The sockeye salmon catch of 20,582 was 6,000 fish above the previous 5 year average (Appendix C.7.).

The chum salmon catch is incidental to the chinook and sockeye salmon fishery in District 4. The 1989 chum salmon catch of 39,395 was well above the previous 5 year average of 27,700 (Appendix C.7.). The escapement index was 6,270 chum salmon, well below the escapement objective of 30,500 (Table 6).

Coho salmon dominated the catch beginning with the 31 July fishing period and a fishing schedule of three 12 hour periods per week began (Table 9). Periods occurred on Monday, Wednesday, and Friday. In the past, this schedule has allowed adequate escapement. The fishery continued this schedule until 25 August when catches had remained below average for 3 consecutive periods (Appendix C.10). Fishing closed for one week to increase escapement in response to below average catches. When the fishery reopened on 1 September, the catch was below average. A period on 8 September had no catch since no processors remained to buy fish. The season closed by regulation on 8 September.

The coho salmon catch of 44,607 was below the previous 5 year average of 63,308 (Appendix C.7). Weather and water conditions prevented escapement surveys. Coho salmon were the second most valuable fish in the Quinhagak District bringing fishermen \$195,838 (Table 4).

The pink salmon catch is incidental to the sockeye and coho fishery in District 4. The 1989 catch of 273 was below the previous 5 year average of 9,260 (Appendix C.7). Pink salmon are scarce during odd years in Kuskokwim Bay.

The Fish and Wildlife Protection Division issued several citations for fishing in closed waters in District 4. Both the Department and Fish and Wildlife Protection saw boats fishing illegally on other occasions when weather or equipment prevented any action.

Goodnews Bay, District 5, All Salmon Species

Goodnews Bay opened on 19 June with fishing periods coincidental with openings in the other districts whenever possible. Coincidental openings were successful in limiting large scale effort transfers (Appendix A.11.). The period with the highest effort was on 28 August when District 4 closed and transfers resulted in 65 boats fishing in District 5 (Table 10). Fewer than 50 boats fished in the district during most of the season (Table 10).

Chinook salmon receive special management consideration in District 5 during June due to the small stock size and run timing that overlaps the more abundant sockeye and chum salmon. The chinook salmon catch of 2,966 fish in 1989 was below the previous 5 year average of 5,089 (Appendix D.5.). The 1989 catch was the lowest catch since 1986. Aerial survey escapement indexes were below objective levels (Table 6). The tower count of 1,915 was below the objective of 3,000 chinook salmon (Appendix A.4.).

Sockeye salmon are the target species in District 5 in June and July. The catch of 19,299 is below the previous 5 year average of 22,300 (Appendix D.5.). Fishermen received \$164,300 for the sockeye catch (Table 4). In-season escapement counts indicated that the escapement objective would be achieved at the tower. Therefore, fishing time increased to three 12 hour periods per week in July when the chinook salmon run ended. By 10 July escapements were lagging. In response two 12 hour periods per week to improve escapement became the schedule. The aerial index in the Goodnews River of 20,600 was at the objective of 20,000 (Table 6). The tower count of 21,186 achieved the revised objective of 20,000 to 30,000 (Appendix D.5.).

The chum salmon catch is incidental to the sockeye salmon fishery in District 5. The 1989 catch of 13,622 is below the previous five

year average of 16,600 (Appendix D.5.). The tower count of 10,380 chum salmon was below the objective of 15,000 (Appendix A.5.).

On 31 July, coho salmon dominated the catch and a schedule of three 12 hour periods per week began (Table 10). In the past, this schedule has allowed adequate escapement. The fishery continued this schedule until 1 September when catches had dropped below normal for the third consecutive period (Appendix D.11.). In addition, fish quality and differences in the species composition showed that some fishermen's catches were not being taken in the waters open to commercial fishing. These catches came from spawning streams. The fishery closed for one week to allow increased escapement. No processors were present for the 8 September opening. The fishery closed by regulation on 8 September.

The 1989 coho salmon catch of 31,849 was slightly below the previous 5 year average catch of 33,400 (Appendix D.5.). Weather prevented escapement surveys. The pink salmon catch of 82 was expected since pink salmon are virtually absent in odd numbered year.

PERSONAL USE FISHERY

The Board of Fisheries established a personal use fishery for the Kuskokwim Area in 1988. Only holders of a valid resident Alaska sport fishing license or an Alaskan resident exempt from licensing may fish in the personal use fishery. Qualified Alaska residents must have a Kuskokwim Area Personal Use Salmon Fishing Permit before fishing. The personal use salmon season is 1 July through 30 September. Salmon taken for personal use may not be used for bait or fed to dogs. Personal use salmon or their parts may not be bought, sold, traded or bartered. Personal Use fishermen must plainly and legibly inscribe their first initial, last name, and home address on a keg or buoy attached to their gill net. Both lobes of the caudal fin (tail fin) must be removed immediately upon landing. The personal use fishery is subject to the same closures before, during, and after commercial fishing periods as the subsistence fishery in the affected district. Gill net, beach seine or fish wheel are the legal gear for personal use fishing except in the Holitna River drainage where spears are also legal. Set or drift gill nets may not exceed 50 fathoms in length. The maximum depth of gill nets is 45 meshes for 6 inch or smaller mesh. On gill nets greater than 6 inches, the mesh may not exceed 35 meshes in depth. A stationary fishing device may not obstruct more than one half of the width of any body of water.

Two Kuskokwim Area Personal Use Salmon Fishing Permits were issued in 1989. Both personal use permits were returned with catch data. The total personal use fishery catch in 1989 was 58 coho salmon (Table 3).

OUTLOOK FOR 1990

The Department is in the process of developing a program that will allow forecasting salmon returns in the Kuskokwim Area. Only broad range harvest projections are possible now. Examining brood year escapements and recent harvest trends provides the projections.

Chinook Salmon

Chinook salmon return to the Kuskokwim Area primarily as age 4, 5, and 6 fish. The brood years for 1990 will be 1984 through 1986. Quinhagak (District 4) has the only directed chinook salmon fishery in the area. Chinook salmon escapement indexes were above objective levels in the Kanektok River in two of the three brood years. Harvest trends for recent years are stable except for the weak 1988 catch. An average harvest of 14,000 to 34,000 chinook should occur in 1990 (Table 11).

Chinook salmon escapements were below objective levels in all three of the brood years in the Kuskokwim River drainage. The larger runs of 1987 through 1989 show improved survival for several of the contributing year classes. This should result in an incidental chinook harvest similar to that of the recent six year range of 19,000 to 56,000 (Table 11).

Goodnews River chinook salmon were below the escapement objectives in two of the three brood years. The recent years' harvest trend has been below average. Below average to average harvest is expected in 1990. The incidental catch probably will be 2,700 to 8,600 chinook salmon (Table 11).

Sockeye Salmon

Quinhagak and Goodnews Bay (District 5) are the only fisheries in the Kuskokwim Area that target on sockeye salmon. Most sockeye salmon return at five years of age in the Kuskokwim Area.

The 1985 brood year escapement index in the Kanektok River was 16,000 sockeye salmon, half of the objective of 32,000. Recent years' harvests vary radically from record highs to near record lows. The 1990 catch should be 6,500 to 21,500 sockeye salmon in District 4 (Table 11).

The 1985 brood year escapement index was 24,131 in the Goodnews River. This was within the objective of 20,000 to 30,000 and should produce an average return. This should result in a harvest of 6,700 to 36,000 sockeye salmon in District 5 (Table 11).

The sockeye salmon catch in the Kuskokwim River is incidental to the chum salmon fishery. The incidental catch in 1990 should 42,000 to 137,000 sockeye salmon (Table 11).

Chum Salmon

Chum salmon return to the Kuskokwim Area primarily as 4 and 5 year old fish. The Kuskokwim River fishery targets on chum salmon. The chum salmon catch is incidental in Districts 4 and 5.

The mixed escapement indexes in the Kuskokwim River in the 1985 and 1986 parent years make a projection difficult. Escapements were at or below objective levels. The record chum salmon runs in the last three years show survival has been above normal. The chum salmon run should be normal in 1990 and the harvest should be between 200,000 to 1,380,000 (Table 11).

The catch of chum salmon should be between 8,500 and 39,000 in District 4 and from 5,000 to 33,000 in District 5 (Table 11).

Coho Salmon

Coho salmon return primarily as 4 year old fish in the Kuskokwim Area. The only coho salmon escapement index is the Kogrukluk River weir in the Kuskokwim drainage. There is very little information on which to base coho salmon abundance.

The parent year (1986) escapement in the Kogrukluk River of 26,230 was slightly above the objective of 25,000. The catch in 1986 in the Kuskokwim River was the largest on record. Based on the 1988 run, the trend for even numbered year coho salmon runs to increase may have stabilized following 1986. An average run in 1990 should produce a catch of 220,000 to 660,000 coho salmon (Table 11).

In Districts 4 and 5, past years catches are the only guide to the coho salmon catch in 1990. In the last five years coho catches have ranged from 30,000 to 61,000 in District 4 and from 16,500 to 32,000 in District 5. The 1990 catches should be within these ranges (Table 11).

FRESHWATER FIN FISH FISHERY

Commercial, subsistence, and recreation fisheries use several other species besides salmon in the Kuskokwim Area. They are inconnu or sheefish (Stenodus leucichthys), whitefish (Coregonus sp. and Prosopium sp), char (Salvelinus sp), rainbow trout (Oncorhynchus mykiss), burbot (Lota lota), Arctic grayling (Thymallus arcticus), northern pike (Esox lucius), Arctic lamprey (Lamperta japonica), rainbow smelt (Osmerus mordax), blackfish (Dallia pectoralis) and

longnose sucker (Catostomus catostomus) (Appendix A-9). The Division of Sport Fish documents the recreational fisheries.

Subsistence Fishery

Seine, set and drift gill nets, fish pots, dip nets, "jigging" through the ice and rod- and-reel are the common gear types for taking miscellaneous fin fish. Most of the subsistence harvest occurs in the winter. Although the harvest continues through out the year. Some species, such as smelt, only can be taken at certain times of year when they are available. Human consumption is the primary use but dog food is a significant use. No regulations limit the number of these miscellaneous species taken for subsistence. There is no funding to monitor this harvest.

Commercial Fishery

The commercial fishery has been sporadic, primarily harvesting whitefish and burbot for local markets. Most of the whitefish harvest occurs incidentally to the salmon fishery. None of the buyers purchased incidental whitefish in 1989. Fishermen retained these fish for their own use.

The regulations require a permit from the Department to conduct commercial fisheries on whitefish, sheefish, char, trout, pike, smelt, burbot, and lamprey. An additional permit from the Commercial Fisheries Entry Commission is also required. Those species also may be taken incidentally to commercial salmon fishing. There were seven freshwater permits issued in 1989 for the Kuskokwim Area. Only three of the permits made landings. The guidelines for permits are:

1. All waters of the area are open, except for the Johnson River drainage, to commercial freshwater fin fishing. The heavy subsistence utilization of those species in the Johnson River drainage is the reason for its closure to commercial fishing.
2. Whitefish, ciscos, smelt, pike, burbot, and lamprey may be taken. Sheefish, char, and trout may not be taken due to their small population, low reproductive rates, and their heavy utilization in the subsistence fishery.
3. Harvest limits are:

Whitefish	5,000
Ciscos	10,000
Pike	200
Burbot	500
Smelt	Unlimited
Lamprey	Unlimited

4. All legal commercial gear types are allowed.
5. Gill nets must be greater than 5 inches stretch mesh and long lines and set lines must use hooks with a gap between point and shank larger than 3/4 inch.

These restrictions minimize the incidental catch of grayling, trout, char and other forbidden species. The restrictions also insure that the catch of whitefish, burbot, and pike is predominantly of older age fish that have spawned at least once.

Appendix F.1. presents the freshwater fin fish fishery catches and value since 1977.

Status of the Stocks

The Department does not monitor the status of the freshwater species in the Kuskokwim Area. Limited Department observations, advisory committee recommendations and fishermen interviews give no indication of declining populations in most drainages.

MISCELLANEOUS SALTWATER FINFISH

An "undocumented commercial" fishery on Saffron or Tom Cod has occurred in the Kuskokwim Area for some time. These fish were surplus to subsistence needs and fishermen and local stores were (often still are) unaware of the regulatory requirements. The Department has been trying to inform buyers and sellers of these requirements. In 1988 the contacted fishermen and buyers obtained the necessary limited entry permits. The primary buyer discovered the fish tickets from 1988 and 1989 in 1990 and reported the landings at that time. The available data on this fledgling fishery is reported in Appendix G.1.

PART II. HERRING FISHERY

INTRODUCTION

Area and District Boundaries

There are five commercial gill net sac roe districts and a subsistence herring fishery in the Kuskokwim Area. The Security Cove District includes all waters between the latitude of Cape Newenham and the latitude of the Salmon River (Figure 8). The Goodnews Bay District includes the waters of Goodnews Bay inside the north and south spits at the mouth and a line between the Ukfigag and Tunulik Rivers (Figure 8). The Cape Avinof District consists of all waters landward of Kikegtek, Pingurbek and Kwigluk Islands from the longitude of Tsintulik Slough ($163^{\circ} 48'$ W. long) to the longitude of the Ursukfak River ($164^{\circ} 11'$ W. long) (Figure 9). The Nelson Island District consists of all waters north of Chinigyak Cape and east of Atrnak Point, and all waters north of Talurarevuk Point and south of the southernmost tip of Chinit Point and east of $165^{\circ} 30'$ W. long., and all waters north of the northernmost tip of Chinit Point and south of Kigigak Island and east of $165^{\circ} 30'$ W. long. (Figure 10). The Nunivak Island District includes all waters extending three miles seaward of mean low water along the northern and east sides of Nunivak Islands from Kikoojit Rocks ($60^{\circ} 19' 30''$ N. lat., $166^{\circ} 56' 30''$ W. long.) to the small bay approximately two miles east of Ingrirak Hill ($60^{\circ} 17' 25''$ N. lat., $166^{\circ} 26' 55''$ W. long.) (Figure 11).

Management Programs

The Security Cove and Goodnews Bay commercial herring fisheries are managed under the Bering Sea Herring Fishery Management Plan that sets the maximum exploitation rate at 20% of the estimated spawning biomass (ADF&G 1989). The Department attempts to harvest stocks in good condition (large volume, increasing abundance, good recruitment) at the upper end of the range (15-20%). Stocks in poor condition (small volume, decreasing abundance, poor recruitment) are exploited at lower than maximum rates (0-15%). The Alaska Board of Fisheries has directed the Department to manage the commercial herring fisheries in the Nelson Island, Nunivak Island and Cape Avinof Districts for an exploitation rate not to exceed 15% of the estimated available biomass (ADF&G 1989). To provide additional protection for the subsistence herring harvest in the Nelson Island District, the following guidelines were established by the Board of Fisheries:

1. The commercial fishery will be allowed to take up to 15% of the herring biomass, compared to up to 20% for most other fisheries having stocks of similar size and condition.

2. The commercial fishing season will be opened when a biomass of 2,500 ton or spawning activity is documented.
3. Periodic closures of the commercial fishery will be scheduled, during which time only subsistence fishing will be allowed.
4. Several important subsistence use areas occur throughout the district (e.g., waters north of Cape Vancouver) and specific areas may be closed to commercial fishing to insure the adequacy of subsistence harvests.
5. The Department will use all available means, including input from local residents, to insure the adequacy of subsistence herring harvests during the commercial fishing season.

Season Summary

The total Kuskokwim Area Pacific herring harvest for 1989 was approximately 1,647 tons with a total estimated value to the fishermen of approximately \$744,000 (Appendix H.1). The only food/bait fishery in this area occurs during the sac-roe fishery when the roe content is below the processors' acceptable minimums. Food/bait sales are a smaller portion of the harvest. Food/bait sales totaled 347 tons, while the sac roe harvest was 1,288 tons. Processors refused an estimated 11 tons of herring that had to be discarded.

Fishing effort, measured in number of fishermen who made deliveries, increased from 1988 levels by 255% in the Security Cove. Fishing effort increased 130% in the Goodnews Bay and 50% in the Cape Avinof districts. Fishing effort decreased 7% in the Nelson Island District (Table 12). Average percent roe recovery from sac-roe quality herring ranged from 8.0 in the Cape Avinof District to 9.4 in the Security Cove District. Percent harvest of estimated herring biomass ranged from 7.0 in the Nelson Island District to 19.6 in the Security Cove District (Appendix H.1).

The 1989 total estimated herring spawning biomass of 11,496 tons for the surveyed portion of the Kuskokwim Area herring districts was 51% lower than the 1988 estimate (Appendix H.1). Ages 8 and older herring comprised 75% of the total run. Younger age fish (ages 3, 4, and 5) accounted for only 11% of the total biomass (Table 13).

During the 1987 season, herring fishermen from many western Alaska communities enquired about the possibility of establishing limited entry in A-Y-K herring fisheries. A decision made by the

Commercial Fisheries Entry Commissions (CFEC) as a first step towards limited entry status for these fisheries to limit participation in the Nelson and Nunivak Island Districts to permit holders who had fished in these fisheries before 1 January 1988. The deadline to submit applications for limited entry permits in these districts is May 31, 1990.

STOCK STATUS

Assessment Methods

Aerial surveys were flown throughout the Pacific herring spawning season in all Kuskokwim Area commercial fishing districts to determine relative abundance, distribution, and biomass of herring. Occurrence and extent of milt, numbers of fishing vessels, and visibility features affecting survey quality were also recorded. Data collection methods were similar to those used since 1978. Aerial surveys occupied about 35 hours in the Kuskokwim Area: 10 hours in Security Cove and Goodnews Bay, 5 hours in the Central Kuskokwim Bay area, 10 hours in Nelson Island and 10 hours in Nunivak Island. Weather and sea conditions were fair in all but the Cape Avinof District, where unfavorable weather (advection fog) and ice hampered survey coverage.

Standard conversions of 1.52 tons/538 ft² (water depths of 16 ft or less), 2.58 tons/538 ft² (water depths between 16 and 26 ft) and 2.83 tons/538 ft² (water depths greater than 26 ft) were used to convert estimated herring school surface areas to biomass within all districts.

Test fishing with variable mesh gill nets occurred in all districts to determine age, sex, size and sexual maturity of herring and to note occurrence of other schooling fishes. In addition, data from the Department's test fishery will be used in a Bering Sea herring stock identification (stock-ID) program. This program, conducted with the North Pacific Fisheries Management Council, will attempt to determine the origin of herring caught in the Bering Sea trawl fisheries. Samples of commercial landings in all districts will be made. A summary of age composition of herring collected from the Department test fishery and the commercial catch by district appears in Table 14. Volunteer gill net vessels collected herring samples within all districts. This information allows interpretation and modification of aerial survey biomass data.

Ground surveys conducted in some districts provide information on the distribution and density of eel grass beds and herring spawn deposition.

Spawning Populations

Security Cove District

Nine aerial surveys were flown on 9 days during the 1989 season, from 8 May to 24 May. On 11 May the first schools (2,830 tons) of herring appeared in the district. A total of 3.1 linear miles of milt occurred in 8 spawn sightings during aerial surveys with the peak spawn observed on 24 May.

The Security Cove test fish crew fished from 10 May to 22 May with variable mesh gill nets. The catch was 1,830 herring, of which 231 were sampled for age, sex, size and maturity. The stock-ID program sample accounted for the remaining herring. Age 8 and older herring comprised 77% of the test fish catch while 5 to 7 year old fish were 23% of the catch.

Volunteer commercial fishermen collected herring samples from designated areas of the district which industry roe technicians evaluated for roe quality. This program allowed the openings to be timed to maximize roe production.

A sample of 225 herring from the commercial catch was 79% age 8 and older. Herring of age 5, 6, and 7 comprised 21% of the commercial catch (Table 14). No age-4 or younger herring were found in the commercial catch sample.

Goodnews Bay District

Nine aerial surveys were flown on 9 days during the 1989 season, from 8 May - 29 May. The largest biomass estimate (4,044 tons) occurred on 24 May. A total of 1.2 linear miles of milt occurred during aerial surveys. The peak of observed spawning was 11 May and 13 May.

Test fishing occurred from 6 May - 29 May. The catch was 3,574 herring, of which 641 were sampled for age-sex-size data and 2,187 for the stock-ID project. Age 8 and older herring made up 75% while aged 4 - 7 fish were 25% of the test catch (Table 13).

Volunteer commercial fishermen collected herring samples from designated areas of the Bay which industry roe technicians evaluated for roe quality. This program allowed the openings to be timed to maximize roe production.

A sample of 500 herring from the commercial catch was 90% age 8 and older. Fish under age 6 were less than 5% of the catch (Table 14).

Cape Avinof District

Between 24 May and 12 June, 7 aerial surveys were flown in the Cape Avinof District. A peak biomass of 689 tons was seen on 31 May. Only 0.04 linear miles of spawn was observed in the Cape Avinof District on 3 June. All surveys were under unsatisfactory conditions, therefore total biomass for the district could not be determined.

The Department's test fishery captured 2,029 herring between 1 June and 12 June, a subsample of 317 for age-sex-size data and the remaining for the stock-ID study. Over 68% of these fish were age 8 or older (Table 13).

Commercial fishermen brought in herring samples from various areas in the district for industry roe technicians to evaluate. This information was used to help determine the timing of fishing periods.

The commercial catch sample of 277 herring was 96% age 8 or older and ages 5 - 7 fish made up 4% of the catch (Table 14).

Nelson Island District

Twelve aerial surveys were flown on 12 days from 24 May to 12 June during the 1989 season. Surveys were made under good to poor conditions. The peak biomass estimate of 2,799 tons occurred on 25 May. A total of 6.6 linear miles of milt occurred during aerial surveys with the peak spawn observed on 26 June.

Test fishing with variable mesh gill nets occurred from 23 May - 8 June. The catch was 2,136 herring, of which 497 were sampled for age, sex, size and maturity. The remaining herring were sampled for the stock ID program. Age 3 to 7 fish made up 32% of the test catch with the other 68% being age 8 or older herring (Table 13).

Volunteer commercial fishermen under the supervision of the Department of Fish and Game conducted additional sampling of the Nelson Island herring stock. Analysis of the samples for roe quality occurred on board processing vessels by company technicians. ADF&G, fishermen and processors used this information to determine the best time for openings.

A commercial catch sample of 388 herring found age 8 and above fish comprised 96% of the commercial catch. Age 5 to 7 fish made up the remaining 4% (Table 14).

Nunivak Island District

Ten aerial surveys were flown on 10 days between 19 May and 12 June during the 1989 season. Most surveys were made under fair to poor

conditions. The peak aerial biomass estimate of 480 tons was made under poor conditions on 24 May. A total of 2.9 linear miles of milt occurred while surveying with peak spawn seen on 25 May.

The Department test fishery captured 1,318 herring, of which 489 were sampled for age-sex-size data. The remainder were sampled for the stock ID program. Seventy-seven percent of the herring were age 8 or older while recruit herring (ages 3, 4 or 5) were only 7% of the catch (Table 13).

SUBSISTENCE FISHERY

Subsistence fishing for Pacific herring in the northeastern Bering Sea is very important in villages of the Kuskokwim River delta. The subsistence fishery is conducted primarily by residents of the coastal villages of Kwigillingok, Kongiganak, Kipnuk, Chefornek, Toksook Bay, Umkumiut, Tununak, and Newtok. The herring stocks used by the subsistence fishery are the same ones targeted by the commercial fishery in the nearby commercial fishing districts.

Subsistence harvest surveys have occurred annually in Nelson Island villages since 1985 and sporadically in Kuskokwim delta villages since 1975. Average annual herring subsistence harvests have been at least 110 tons since 1975 (Appendix H.2). During 1989, the subsistence survey of Nelson Island communities resulted in an estimated 144 tons of subsistence herring harvested. Subsistence survey results reflect harvest trends and reported catches represent minimum figures since not all fishermen are contacted and other Kuskokwim River delta villages were not surveyed.

COMMERCIAL FISHERY

Security Cove District

The commercial herring fishery in the Security Cove District has opened and closed by emergency order since 1981 to provide for an orderly fishery and periodic reassessments of herring biomass. Only one four hour fishing period on 17 May was needed to harvest 553.6 tons (Table 15).

All but 10 tons of the 1989 season harvest was sac roe quality with an average roe recovery of 9.4%. Value of the harvest was about \$265 thousand (Appendix H.1). Average price was \$500 per ton for 10% roe recovery, with an increase or decrease of \$50 per ton for each percentage point above or below 10%.

Eight processors purchased herring in Security Cove (Table H.1.). A total of 110 fishermen made 114 deliveries in the 1989 fishery. Kuskokwim Area residents did not make landings in the Security Cove herring fishery during the 1989 season.

The commercial exploitation rate of Pacific herring was 19.6% of the estimated available biomass (Table 13). Ages 8 and older Pacific herring comprised 74% of the total harvest. There were no herring under age 5 in the commercial catch sample.

A Fish and Wildlife Protection helicopter was present in the Security Cove District during the opening. No major fishing violations were reported.

Goodnews Bay District

Since 1981, to provide for an orderly fishery and periodic reassessments of herring biomass, commercial herring fishing in Goodnews Bay has opened and closed by emergency order. A total of 615.6 tons were taken during 56 hours of fishing in 8 periods.

The initial guideline harvest level was raised from 462 tons to 606 tons on 24 May when the observed biomass (4,044 tons) exceeded the pre-season projection (3,077 tons). Beach meetings with fishermen occurred to monitor the quality of the herring in Goodnews Bay. Samples provided by volunteer fishermen and analyzed by industry roe technicians.

The first commercial opening on 23 May, from 0630 to 1200, produced a harvest of 28.1 tons (8.2 tons sac-roes and 19.9 tons bait). The district reopened for four hours at 2200 on 23 May and 11.6 tons were harvested (8.1 tons sac-roes and 3.5 tons bait). Over both periods, 53 fishermen made 62 landings with an average roe content of 8.7% for sac-roes quality fish. The district reopened on 24 May for eight hours at 0730. A total of 114.9 tons (76.0 tons sac-roes and 38.9 tons bait) was delivered by 94 fishermen and average roe content was 8.0%. The fourth opening was for eight hours starting 0800 on 25 May. This opening had 117 fishermen delivering 278.9 tons (237.5 tons sac-roes and 41.4 tons bait) with 8.1% average roe content. Two eight hour openings on 26 and 27 May had limited participation due to bad weather. Only 9 fishermen delivered 3.7 tons of herring with 9.2% roe content on 26 May and 6 fishermen sold 5.8 tons of fish with a roe content of 8.6% on 27 May. Weather improved for the eight hour period starting at 1030 on 28 May in which 34 fishermen caught 33.7 tons (18.3 tons sac-roes and 15.3 tons bait). Average roe content for herring sold as sac-roes was 9.5%. The final opening was for eight hours on 29 May beginning at 1130. Sac-roes herring caught this period amounted to 95.8 tons with average roe content of 9.0% and bait herring deliveries totaled 43.3 st. Fifty eight fishermen made 93 landings in the last opening.

Sac roes herring accounted for 74% (453 tons) of the harvest. Waste of herring was not a problem. Average roe recovery for the season was 8.4%. The value of the catch to the fishermen was \$335 thousand. Average price was \$600 per ton for 10% roe recovery,

with an increase or decrease of \$60 per ton for every percentage point above or below 10%. Six processors purchased Pacific herring (Table 12). Most processors established 7% as the minimum roe recovery required for sac roe quality Pacific herring. Herring of less than 7% roe recovery sold as bait and the price averaged \$50 per ton. A total of 138 fishermen made 533 deliveries in the 1989 fishery. Local fishermen (i.e., residents of Platinum, and Goodnews Bay) accounted for 51% of the harvest.

The exploitation rate of herring was 10.7% of estimated available biomass (Appendix H.1). Ages 8 and older herring comprised 73% of the total harvest. No age-4 or younger herring occurred in the harvest sample.

Management of the 1989 herring fishery in Goodnews Bay was without major problems. The Fish and Wildlife Protection vessel Woldstad patrolled the district during the season. No major fishing violations were reported.

Cape Avinof District

This was the second year that a commercial herring fishery occurred in the Cape Avinof District. As in all other Kuskokwim Bay districts, commercial herring fishing is regulated by emergency order. A total of 128.8 tons of herring were harvested during 194 hours of fishing time.

At the request of the Kwigillingok IRA Council, the eastern boundary of the Cape Avinof District was moved by emergency order on 1 May from Tsintulik Slough to 4 miles east of Kwigillingok (Figure 9). This area, previously closed to commercial fishing at the request of local residents to prevent interference with the subsistence harvest.

The district was first open to commercial harvest on 4 June and remained open until 12 June. The district closed when the last purchasing company pulled out due to prior commitments. The harvest of 128.8 tons was 288 tons short of the guideline.

Ninety tons of the herring was of sac roe quality with an average roe recovery of 8.0%. Three companies bought herring during the 1989 season. A total of 147 fishermen made 335 deliveries. Local fishermen (i.e., residents of Kipnuk, Kwigillingok, Kongiganak, Chefnak and Tuntutuliak) accounted for 87% of the harvest. The ex-vessel value of the catch was \$54 thousand.

The exploitation rate of herring was 18.7% of the estimated available biomass (Appendix H.1). Ages 8 and older herring comprised 97% of the total harvest. No age-4 or younger herring occurred in the harvest sample.

Nelson Island District

The commercial harvest of herring began in the Nelson Island District in the 1985 season. To provide for an adequate subsistence harvest, an orderly commercial fishery, and to allow for periodic reassessments of the herring biomass the commercial fishery has opened and closed by emergency order. Five commercial fishing periods from 28 May to 7 June totaled 15 hours of fishing time. The commercial fishery took 232.2 ton of herring (Table 15).

The first commercial opening in the district occurred starting at 0600 on 28 May. During the three hour period 68 fishermen delivered 49.1 tons of sac-roe herring with an average roe content of 8.0% and 6.5 tons of bait. An additional 10.6 tons of herring was dumped due to low roe content. A second opening for three hours beginning at 1900 on 29 May saw 133 fishermen catch 32.9 tons of roe herring averaging 8.4% roe content and 70.0 tons bait. On the recommendation of Toksook Bay fishermen no further openings occurred in May. At 2000 on 1 June another three hour fishing period occurred in which 21.5 tons of herring with a 9.9% roe content and 9.4 tons of bait were harvested by 82 fishermen. The fourth opening, for four hours starting at 1130 on 3 June, had 33 fishermen catch 18.4 tons with 8.5% roe content and 13.6 tons of bait. A two hour period occurred on 7 June but no processors were present to buy fish.

Sac roe herring accounted for 52% (122 ton) of the harvest. Average sac roe recovery was 8.5%. Eleven tons of herring were refused and dumped overboard. The commercial herring harvest was worth \$57 thousand to the fishermen (Appendix H.1). Average price was \$500 per ton for 10% roe recovery, with an increase or decrease of \$50 per ton for each percentage point above or below 10%. The average price per ton paid for food or bait herring was \$50. Four companies operated in the Nelson Island District (Table 12). A total of 162 fishermen participated in the fishery. This represents a 7% decrease in effort levels since 1988. Area fishermen (residents of northern Kuskokwim Bay and Etolin Strait villages) accounted for 67% of the harvest.

The commercial exploitation rate of herring was 7.0%. Ages 8 and older herring comprised 96% of the total harvest.

The Fish and Wildlife Protection vessel, Woldstad, patrolled the Nelson Island District during the season.

Nunivak Island District

As in the Nelson Island District, the initial commercial fishery for herring in the Nunivak Island District occurred in 1985. To provide for an orderly fishery and to allow for periodic reassessments of herring biomass the fishery has opened and closed by emer-

gency order. A total of 116.2 tons of herring were caught during 186 hours of fishing time in 1989.

A two hour "test" opening held starting at 1530 on 22 May. Three fishermen delivered 0.9 tons of herring with an average roe content of 7.2% and 0.5 tons of bait. An aerial survey on 24 May observed 480.3 tons of herring in the district. Another opening of four hours beginning at 1200 on 25 May saw 27 fishermen land 8.0 tons of herring with an average roe content of 8.2% and 3.7 tons bait. Low catch rates and declining aerial survey biomass estimates resulted in the district opening until further notice at 1200 on 29 May and closing on 3 June. During this 180 hour opening 70.5 tons with an average roe content of 9.5% and 32.7 tons of bait herring were harvested.

OUTLOOK AND MANAGEMENT STRATEGY FOR 1990

Based upon apparent weak recruitment of younger age classes (ages 4-7) and reduced returns of the abundant 1978 and 1977 year classes (ages 12 and 13 herring) a decline in the harvestable surplus of herring available in all districts is expected in 1990. Forecast methods are under development and reliable estimates of recruitment are not available, so observed herring spawning biomass will determine harvest levels during the season. If it is not possible to determine herring abundance using aerial survey methods, assessment of stock abundance will use information from test and commercial catches along with spawn deposition observations.

Projections from post-season escapement estimates, using mean rates of natural mortality and growth for each age class, suggest that the 1990 minimal spawning biomass for the Kuskokwim Area herring stocks (Security Cove to Nelson Island) should be roughly 8,280 tons (Table 16). However, increased recruitment of ages 3 through 5-year-old herring could increase this figure. (NOTE - use all projection estimates with extreme caution as projection methods are under development and the data base is not extensive.)

Available data on age composition shows a continuation of the downward trend in herring spawning biomass for all Kuskokwim Area districts due to the lack of any significant recruitment of younger age fish into the population beyond the 1978 year class. The factors responsible for this decline are not known. The resources now available to conduct research activities cannot support an investigation extensive enough to find the causes of the decline. Continuation of this declining biomass trend may precipitate reduced harvest levels or complete closure of some commercial fishing districts during the 1990 commercial fishing season. Reduced exploitation rates during 1990 will allow a harvest while protecting the declining populations.

Security Cove District

The commercial season opens when the biomass reaches 1,200 tons or spawning activity occurs. The occurrence and length of fishing periods depends on stock strength, fishing effort, and spawning activity. The declining recruitment of younger age fish into the population requires a 15% exploitation rate for the Security Cove herring stock in 1990. The 1990 projected return is 1,560 tons. A 15% exploitation rate would result in a harvest of about 235 tons (Table 16). A larger catch may occur if the 1990 biomass assessment is greater than the projection.

Goodnews Bay District

Management strategy for this district will be similar to that used for Security Cove. The season will open and close by emergency order when a biomass of 1,200 tons occurs or spawning activity occurs. The 1990 projected return of herring to the Goodnews Bay District is 2,330 tons that at a 15% exploitation rate would result in a harvest of 350 tons (Table 16). A larger catch may occur if the 1990 biomass assessment is greater than the projection.

Cape Avinof District

Either spawning activity or a biomass of 500 tons must be observed before the commercial herring season can be opened. The season will open and close by emergency order. The projected 1990 biomass for the Cape Avinof area stock is 2,020 tons (Table 16). The Cape Avinof District's herring stocks appear to be showing a lack of recruitment similar to that seen in all southwestern Alaska herring fisheries. The 15% exploitation rate will take into account the limited data base for this area and insure recognition of the subsistence fishing priority. Assuming a 15% commercial exploitation rate, the projected harvest would be 300 tons of herring. With an additional estimated 30 tons of subsistence herring harvest, total exploitation rate in 1990 would be 16%.

Nelson Island District

In the Bering Sea Herring Fishery Management Plan, the Alaska Board of Fisheries set minimum biomass levels that would allow a commercial herring fishery in the Nelson and Nunivak Island Districts. The minimum biomass level is 2,500 tons in the Nelson Island District and 1,500 tons in the Nunivak Island District. The in-season estimate of herring biomass must exceed the threshold level before a commercial fishery can be allowed.

The peak biomass estimate for the Nelson Island District was 3,320 tons in 1989 (Appendix H.1). Over 50% of the herring were age 9

and 10. Only 16% of the herring were recruits (age 4 and 5). The spawning biomass projected to return to the Nelson Island District in 1990 is 2,050 tons (Table 16), which is lower than the threshold biomass needed to have a commercial fishery. The decline is due to the high mortality rates of older age herring. The projected decline in biomass and the importance of protecting the herring stock for the subsistence fishery is the reason for closure of the fishery, unless the stock reaches the biomass threshold. If the in-season biomass estimate is greater than 2,500 tons, a commercial fishery will be allowed. If the estimated biomass is less than 2,800 tons the exploitation rate in the commercial fishery will be under 10 percent. The harvest level will not exceed 10% unless available biomass greatly exceeds the threshold biomass.

Nunivak Island District

The peak biomass estimate was 620 tons in 1989 (Appendix H.1). Over 70% of the herring were ages 9 or older and only 2% were recruit herring (ages 3, 4, and 5). The projected biomass of herring returning to the Nunivak Island District in 1990 is 320 tons (Table 16). This is lower than the 1,500 tons threshold biomass level necessary to allow a commercial fishery. The decline is due to the high mortality rates of older age herring. If the in-season biomass estimate is greater than 1,500 tons, a commercial fishery will be allowed. If the estimated biomass is less than 1,700 tons the exploitation rate in the commercial fishery will be under 10 percent. The harvest level will not exceed 10 percent of the estimated biomass unless available biomass greatly exceeds the threshold biomass.

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Table 1. KUSKOKWIM AREA FISH TICKET SUMMARY, 1989

<u>STAT AREA</u>	<u>DISTRICT NAME</u>	<u>BATCH RANGE</u>	<u>TICKET RANGE</u>	<u>TOTAL TICKETS</u>
335-10	Lower Kuskokwim(S)	101-171	700,001--711,825	11,825
335-20	Middle Kuskokwim(S)	201-205	720,001--720,145	145
335-40	Quinhagak(S)	401-416	730,001--732,463	2,463
335-50	Goodnews Bay(S)	501-511	740,001--741,129	1,129
335-49	Security Cove(H)	900,916	725,101--726,730	113
335-50	Goodnews Bay(H)	901,907,908 911,912	725,223--726,619	533
335-60	Nelson Island(H)	903-906 913,914	725,421--726,626	439
335-70	Nunivak Island(H)	901,902,913	725,210--726,625	236
335-80	Cape Avinof(H)	909,910,915	726,092--726,724	335
<u>TOTAL SALMON</u>		<u>203 BATCHES</u>		<u>15,562 TICKETS</u>
<u>TOTAL HERRING</u>		<u>17 BATCHES</u>		<u>1,656 TICKETS</u>
<u>TOTAL FISH TICKETS</u>		<u>220 BATCHES</u>		<u>17,218 TICKETS</u>

Table 2. Reported and Estimated Total Subsistence Harvest in Sampled Kuskokwim Area Communities by Species, 1989.

	Total HH's HH's Contctd		Chinook Reported Est. Harvest Total		Sockeye Reported Est. Harvest Total		Coho Reported Est. Harvest Total		Chum Reported Est. Harvest Total	
Kipnuk	94	3	134	*	402	*	243	*	37	*
Kwigillingok	32	0	0	*	0	*	0	*	0	*
Kongiganak	56	35	979	1307	454	603	397	525	1351	1830
Tuntutuliak	59	43	2764	3552	785	1018	374	484	3534	4559
Eek	60	55	1553	1685	155	168	275	299	890	966
Kasigluk	93	73	1821	2013	210	231	582	687	2602	2872
Nunapitchuk	82	60	2174	3087	695	987	343	487	4700	6674
Atmautluak	53	31	824	1227	992	1129	617	971	2419	3014
Napakiaik	79	62	3221	3785	1480	1722	1521	1763	5965	6934
Napaskiak	71	61	3893	4181	577	620	753	809	11361	12203
Oscarville	17	9	914	1200	231	329	150	684	1006	1132
Bethel	1281	761	13352	19336	3981	5712	12545	18594	13861	19214
Kwethluk	126	104	6070	7388	2007	2443	2717	3307	8412	10237
Akiachak	93	82	4988	5438	2358	2584	1680	1879	6700	7307
Akiak	55	36	3107	4562	991	1301	1885	2523	4760	7216
Tuluksak	67	52	3004	3781	1746	2234	971	1261	5859	7961
<u>Lower Kuskokwim Total</u>	2192	1464	48664	62542	16662	21080	24810	34273	73420	92118
Lower Kalskag	68	50	2181	2843	583	765	551	731	3139	4069
Upper Kalskag	42	39	1144	1256	307	338	635	688	3089	3427
Aniak	172	111	2060	2860	549	761	1776	2461	6736	9332
Chuathbaluk	23	22	421	446	216	229	288	305	2153	2280
<u>Mid. Kuskokwim Total</u>	305	222	5806	7404	1655	2093	3250	4185	15117	19107
Crooked Creek	34	25	312	427	302	413	392	536	564	772
Red Devil	11	9	128	156	272	332	1240	1516	943	1153
Sleetmute	25	20	336	420	621	776	807	1009	1450	1813
Stony River	14	13	639	692	1001	1084	564	611	1248	1352
Lime Village	13	13	105	105	5653	5653	2025	2025	2100	2100
McGrath	153	149	494	519	0	0	672	697	2143	2258
Takotna	6	6	62	62	0	0	40	40	250	250
Nikolai	29	25	646	706	0	0	295	328	1051	1178
Telida	3	3	1	1	0	0	60	60	15	15
<u>Upper Kuskokwim Total</u>	288	263	2723	3089	7849	8259	6095	6821	9764	10891
<u>KUSKOKWIM RIVER TOTAL</u>	2785	1949	57193	73035	26166	31432	31455	45279	98301	122116
Quinhagak	119	103	2802	3048	417	450	2965	3346	1168	1262
Goodnews Bay	67	45	264	414	451	704	513	819	375	609
Platinum	25	18	32	44	109	151	49	68	101	140
<u>Quinhagak, Goodnews & Platinum Total</u>	211	166	3098	3507	977	1305	3527	4232	1644	2011
Mekoryuk	49	21	0	0	0	0	117	273	3601	8402
Newtok	60	14	5	10	10	20	15	30	20	40
Nightmute	26	2	0	*	0	*	70	*	30	*
Toksook Bay	76	11	136	450	286	1066	44	87	95	203
Tununak	86	9	5	28	83	135	9	86	16	86
<u>Nelson Island Communities Totals</u>	271	55	146	488	379	1221	185	477	3732	8732
Totals	3267	2170	60437	77030	27522	33958	37867	49988	103677	132858

* No estimates are used for Kipnuk, Kwigillingok or Nightmute.

Table 3. Kuskokwim Area commercial^a and subsistence salmon catches by species and district, 1989.

DISTRICT	Chinook	Sockeye	Coho	Pink	Chum	Total
District 1, Lower Kuskokwim River:						
Commercial	41,834	41,651	462,935	446	728,236	1,275,102
Subsistence	62,542	21,080	34,273	na	92,118	210,013
Personal Use			58			58
SUBTOTAL	104,376	62,731	497,266	446	820,354	1,485,173
District 2, Middle Kuskokwim River:						
Commercial	1,383	1,096	16,921	18	20,946	40,364
Subsistence	7,404	2,093	4,185	na	19,107	32,789
SUBTOTAL	8,787	3,189	21,106	18	40,053	73,153
Upper Kuskokwim River:						
Commercial	CLOSED TO COMMERCIAL SALMON FISHING					
Subsistence	3,089	8,259	6,821	na	10,891	29,060
SUBTOTAL	3,089	8,259	6,821	na	10,891	29,060
Kuskokwim River:						
Commercial	43,217	42,747	479,856	464	749,182	1,315,466
Subsistence	73,035	31,432	45,279	na	122,116	271,862
Personal Use			58			58
SUBTOTAL	116,252	74,179	525,193	464	871,298	1,587,386
District 4, Quinhagak:						
Commercial	20,820	20,828	44,607	273	39,395	125,923
Subsistence	3,048	450	3,346	na	1,262	8,106
SUBTOTAL	23,868	21,278	47,953	273	40,657	134,029
District 5, Goodnews Bay:						
Commercial	2,966	19,299	31,849	82	13,622	67,818
Subsistence	458	855	887	na	749	2,949
SUBTOTAL	3,424	19,154	32,736	82	14,371	70,767
Kuskokwim Bay:						
Commercial	23,786	40,127	76,456	355	53,017	193,741
Subsistence	3,507	1,305	4,232	na	2,011	11,055
SUBTOTAL	27,293	41,432	80,688	355	55,028	204,796
Etolin Strait:						
Commercial	Closed to Commercial Fishing					
Subsistence	488	1,221	477	na	8,732	10,918
SUBTOTAL	488	1,221	477	na	8,732	10,918
Kuskokwim Area:						
Commercial	67,003	82,874	556,312	819	802,199	1,509,207
Subsistence	77,030	33,958	49,988	na	132,858	293,834
Personal Use			58			58
TOTAL	144,033	116,832	606,358	819	935,057	1,803,099

^a Includes salmon caught in the Kuskokwim test fish projects and sold to processors.

Table 4. 1989 Kuskokwim Area commercial salmon fishery final calculated value by district and area.

	CHINOOK	SOCKEYE	COHO	PINK	CHUM	DISTRICT TOTAL
LOWER KUSKOKWIM DISTRICT 1						
TOTAL FISH	41,834	41,651	462,935	446	728,236	1,275,102
TOTAL POUNDS	630,756	306,381	3,293,385	1,534	4,930,158	9,162,214
TOTAL DOLLARS	\$473,067	\$367,567	\$1,811,361	\$77	\$1,268,058	\$3,920,130
AVERAGE WEIGHT	15.11	7.40	7.14	3.44	6.77	
MIDDLE KUSKOKWIM DISTRICT 2						
TOTAL FISH	1,383	1,061	16,921	18	20,946	40,329
TOTAL POUNDS	23,125	7,674	115,884	75	143,178	289,936
TOTAL DOLLARS	\$17,343	\$9,208	\$63,736	\$3	\$37,226	\$127,516
AVERAGE WEIGHT	16.70	7.00	6.80	4.10	6.80	
QUINHAGAK DISTRICT 4						
TOTAL FISH	20,820	20,582	44,607	273	39,395	125,677
TOTAL POUNDS	402,388	144,133	356,070	860	284,729	1,188,180
TOTAL DOLLARS	\$301,791	\$172,959	\$195,838	\$43	\$74,029	\$744,660
AVERAGE WEIGHT	19.30	7.00	7.40	3	7.20	
GOODNEWS BAY DISTRICT 5						
TOTAL FISH	2,966	19,299	31,849	82	13,622	67,818
TOTAL POUNDS	52,496	136,917	273,029	333	98,847	561,622
TOTAL DOLLARS	\$39,372	\$164,300	\$150,165	\$17	\$25,700	\$379,554
AVERAGE WEIGHT	17.70	7.10	8.1	4.00	7.20	
TOTAL ALL DISTRICTS						
TOTAL FISH	67,003	82,628	556,312	819	802,199	1,508,961
TOTAL POUNDS	1,108,765	136,917	273,029	333	5,454,953	561,622
TOTAL DOLLARS	\$831,573	\$714,034	\$2,221,100	\$140	\$1,418,288	\$5,171,860
AVERAGE WEIGHT	16.55	7.20	7.26	3.42	6.80	
AVERAGE PRICE/LB	\$0.75	\$1.20	\$0.55	\$0.05	\$0.26	
PRICE/FISH	\$12.41	\$8.65	\$3.99	\$0.17	\$1.77	
ROE SALES						\$22,165
GRAND TOTAL FOR AREA						\$5,194,025

Table 5 . Kuskokwim Area salmon entry permits issued by village,
1989.

VILLAGE	NUMBER OF ENTRY PERMITS
Akiachak	58
Akiak	25
Aniak	11
Atmautluak	26
Bethel	165
Chuathbaluk	1
Chefornak	4
Eek	35
Goodnews Bay	32
Lower Kalskag	4
Upper Kalskag	2
Kasigluk	43
Kipnuk	18
Kongiganak	20
Kwethluk	60
Kwigillingok	17
Mekoryuk	1
McGrath	2
Napakiak	40
Napaskiak	26
Newtok	3
Nunapitchuk	44
Oscarville	8
Platinum	15
Quinhagak	80
Tuluksak	27
Tuntutuliak	47
Kuskokwim Area Subtotal	<u>814</u>
Anchorage	2
Dillingham	1
Eagle River	1
Manokotak	2
Togiak	2
Non-local Alaska residents Subtotal	<u>8</u>
West Linn, Oregon	1
Saranac Lake, New York	1
Nonresident Subtotal	<u>2</u>
Total # of Permits	<u>824</u>

Table 6. Peak aerial survey salmon escapement estimates in Kuskokwim Area spawning tributaries by species, 1989^a.

	Location	Date	Chinook	Sockeye	Coho	Chum
<u>KUSKOKWIM RIVER:</u>						
1	Aniak R.	26-Jul	2,109	0	b	6,463
	Salmon R.	26-Jul	672	0	b	130
	Kipchuk R.	26-Jul	1,598	na	b	230
2	Eek R.	25-Jul	1,042	0	b	5
3	Kasigluk R.	26-Jul	75	na	b	4,950
4	Kisaralik R.	27-Jul	152	0	b	770
5	Kwethluk R.	26-Jul	1,157	0	b	1,617
	Crooked Cr.	26-Jul	38	0	b	0
6	Salmon R.	27-Jul	446	0	b	0
15	Takotna R.	27-Jul	0	0	na	0
	Nixon Fork	27-Jul	58	0	na	0
16	Telaquana Lake	28-Jul	0	0	na	0
<u>KUSKOKWIM BAY:</u>						
16	Goodnews River ^b	25-Jul				
		&				
		15-Aug	1,928	21,350	b	4,362
17	Kanektok River	25-Jul	7,914	14,735	1,755	6,270
18	Jacksmith Creek	3-Sept	na	na	20	na
19	Salmon River	11-July	0	2	na	100

a Peak aerial salmon escapement index count. Aerial index counts do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable conditions.

b North and Middle Forks.

Table 7. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1989.

Date	Hours	Permits	Lndgs	Chinook		Sockeye		Coho		Pink		Chum	
				No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
06/19	8	374	442	9,204	3.08	5,495	1.84	0	0.00	0	0.00	41,789	13.97
06/23	8	277	400	6,011	2.71	7,011	3.16	0	0.00	0	0.00	65,650	29.63
06/26	8	126	194	1,862	1.85	3,746	3.72	0	0.00	0	0.00	32,373	32.12
06/30	8	642	858	9,232	1.80	10,214	1.99	0	0.00	8	0.00	131,629	26.63
07/03	6	629	708	4,600	1.22	5,808	1.54	0	0.00	14	0.00	91,345	24.20
07/05	6	553	607	3,311	1.00	2,917	0.88	3	0.00	41	0.01	85,727	25.84
07/08	6	621	697	3,136	0.84	3,177	0.85	9	0.00	67	0.02	119,066	31.96
07/11	6	616	642	1,691	0.46	1,565	0.42	126	0.03	69	0.02	78,053	21.12
07/14	6	590	604	1,216	0.34	796	0.22	230	0.06	49	0.01	44,401	12.54
07/18	6	437	447	868	0.33	451	0.17	2,216	0.85	53	0.02	26,407	10.07
07/27	6	562	565	210	0.06	95	0.03	5,651	1.68	41	0.01	5,716	1.70
08/03	6	679	778	174	0.03	30	0.01	99,022	18.23	32	0.01	3,615	0.67
08/07	6	642	666	78	0.02	22	0.01	73,514	19.08	25	0.01	868	0.23
08/09	6	644	772	40	0.01	7	0.00	103,158	26.70	11	0.00	432	0.11
08/12	6	650	682	34	0.01	8	0.00	81,970	21.02	13	0.00	122	0.03
08/15	6	616	626	25	0.01	4	0.00	23,071	6.24	7	0.00	119	0.03
08/18	6	381	383	7	0.00	5	0.00	5,938	2.60	4	0.00	16	0.01
08/23	6	528	543	19	0.01	14	0.00	30,940	9.77	4	0.00	21	0.01
08/26	6	508	526	17	0.00	13	0.00	20,881	5.14	3	0.00	15	0.00
08/29	6	423	430	7	0.00	9	0.00	11,080	3.27	4	0.00	21	0.01
09/01	6	194	195	3	0.00	1	0.00	3,225	2.77	1	0.00	7	0.01
ADF&G*		2	16	89		263		1,901		0		844	
Total	134	745	11,780	41,834	0.66	41,651	0.71	462,935	5.59	446	0.01	728,236	10.95
Average wt. (lbs)				15.10		7.40		7.14		3.44		6.77	

a fish caught by Alaska Department of Fish and Game test fish projects

Date	Hours	Permits	Lndgs	Chinook	Sockeye	Coho	Pink	Chum
06/19	8	374	442	9,204	5,495	0	0	41,789
06/23	8	277	400	6,011	7,011	0	0	65,650
06/26	8	126	194	1,862	3,746	0	0	32,373
06/30	8	642	858	9,232	10,214	0	8	131,629
07/03	6	629	708	4,600	5,808	0	14	91,345
07/05	6	553	607	3,311	2,917	3	41	85,727
07/08	6	621	697	3,136	3,177	9	67	119,066
07/11	6	616	642	1,691	1,565	126	69	78,053
07/14	6	590	604	1,216	796	230	49	44,401
07/18	6	437	447	868	451	2,216	53	26,407
07/27	6	562	565	210	95	5,651	41	5,716
08/03	6	679	778	174	30	99,022	32	3,615
08/07	6	642	666	78	22	73,514	25	868
08/09	6	644	772	40	7	103,158	11	432
08/12	6	650	682	34	8	81,970	13	122
08/15	6	616	626	25	4	23,071	7	119
08/18	6	381	383	7	5	5,938	4	16
08/23	6	528	543	19	14	30,940	4	21
08/26	6	508	526	17	13	20,881	3	15
08/29	6	423	430	7	9	11,080	4	21
09/01	6	194	195	3	1	3,225	1	7
ADF&G*		2	16	89	263	1,901	0	844
Total	134	745	11,780	41,834	41,651	462,935	446	728,236
Average wt. (lbs)				15.10	7.40	7.14	3.44	6.77

Table 8. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1989.

Date	Hours	Permits	Lndgs	Chinook		Sockeye		Coho		Pink		Chum	
				No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
06/30	6	15	18	610	5.08	587	4.89	0	0.00	0	0.00	7,353	61.28
07/03	6	18	20	371	3.44	238	2.20	0	0.00	0	0.00	5,101	47.23
07/05	6	14	14	264	3.14	176	2.10	0	0.00	0	0.00	3,542	42.17
07/11	6	14	16	128	1.52	95	1.13	0	0.00	13	0.15	4,580	54.52
08/07	6	22	23	3	0.02	0	0.00	6,607	50.05	2	0.02	238	1.80
08/09	6	18	19	3	0.03	0	0.00	5,714	52.91	0	0.00	114	1.06
08/15	6	15	15	1	0.01	0	0.00	1,867	20.74	2	0.02	7	0.08
08/18	6	20	20	3	0.03	0	0.00	2,733	22.78	1	0.01	11	0.09
Total	48	30	145	1,383	1.66	1,096	1.29	16,921	18.31	18	0.03	20,946	26.03
Average wt. (lbs)				16.72		7.00		6.85		4.17		6.84	

Table 9. Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1989.

Date	Hours	Permits	Lndgs	Chinook		Sockeye		Coho		Pink		Chum	
				No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
06/15	12	140	148	3,415	2.03	134	0.08	0	0.00	0	0.00	1,122	0.67
06/19	12	85	113	3,525	3.46	741	0.73	0	0.00	0	0.00	1,913	1.88
06/23	12	85	110	2,039	2.00	1,741	1.71	0	0.00	0	0.00	1,774	1.74
06/26	12	74	77	1,741	1.96	1,717	1.93	0	0.00	0	0.00	1,529	1.72
06/30	12	83	90	1,185	1.19	2,095	2.10	0	0.00	7	0.01	4,903	4.92
07/03	12	78	107	2,771	2.96	3,191	3.41	0	0.00	13	0.01	1,788	1.91
07/05	12	62	95	2,710	3.64	1,810	2.43	0	0.00	12	0.02	6,778	9.11
07/07	12	95	96	1,228	1.08	2,490	2.18	0	0.00	0	0.00	2,939	2.58
07/10	12	108	113	646	0.50	2,229	1.72	0	0.00	0	0.00	4,774	3.68
07/12	12	85	86	450	0.44	1,468	1.44	0	0.00	45	0.04	3,211	3.15
07/14	12	68	70	220	0.27	878	1.08	1	0.00	25	0.03	732	0.90
07/18	12	66	91	260	0.33	694	0.88	25	0.03	8	0.01	4,343	5.48
07/21	12	105	112	248	0.20	477	0.38	124	0.10	38	0.03	1,941	1.54
07/24	12	57	59	83	0.12	215	0.31	63	0.09	38	0.06	499	0.73
07/27	12	51	52	76	0.12	156	0.25	226	0.37	12	0.02	465	0.76
07/31	12	69	77	46	0.06	210	0.25	925	1.12	20	0.02	191	0.23
08/02	12	67	74	45	0.06	94	0.12	962	1.20	14	0.02	185	0.23
08/04	12	64	75	30	0.04	93	0.12	1,755	2.29	15	0.02	116	0.15
08/07	12	74	103	27	0.03	30	0.03	8,188	9.22	3	0.00	101	0.11
08/09	12	76	87	22	0.02	34	0.04	5,295	5.81	3	0.00	33	0.04
08/11	12	72	94	8	0.01	6	0.01	7,376	8.54	1	0.00	4	0.00
08/14	12	101	103	12	0.01	17	0.01	1,671	1.38	4	0.00	13	0.01
08/16	12	58	68	6	0.01	11	0.02	1,622	2.33	3	0.00	8	0.01
08/18	12	77	118	10	0.01	11	0.01	8,824	9.55	6	0.01	7	0.01
08/21	12	87	90	7	0.01	23	0.02	2,110	2.02	0	0.00	9	0.01
08/23	12	67	72	5	0.01	7	0.01	2,400	2.99	4	0.00	10	0.01
08/25	12	60	65	5	0.01	7	0.01	1,633	2.27	2	0.00	5	0.01
09/01	12	52	64	0	0.00	3	0.00	1,407	2.25	0	0.00	2	0.00
09/08	12	0	0			----- NO BUYERS -----							
Total	348	227	2,509	20,820	0.73	20,582	0.76	44,607	1.84	273	0.01	39,395	1.49
Average wt. (lbs)				19.33		7.00		7.98		3.15		7.23	

Table 10. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1989.

Date	Hours	Permits	Chinook		Sockeye		Coho		Pink		Chum		CPUE
			Lndgs	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	
6/19	12	18	23	390	1.81	551	2.55	0	0.00	0	0.00	557	2.58
6/23	12	27	29	583	1.80	1,466	4.52	0	0.00	0	0.00	886	2.73
6/26	12	30	30	416	1.16	1,909	5.30	0	0.00	0	0.00	1,241	3.45
6/30	12	33	36	460	1.16	2,037	5.14	0	0.00	0	0.00	1,349	3.41
7/03	12	38	43	156	0.34	2,589	5.68	0	0.00	0	0.00	1,309	2.87
7/05	12	26	26	95	0.30	1,254	4.02	0	0.00	0	0.00	976	3.13
7/07	12	41	42	196	0.40	2,083	4.23	0	0.00	0	0.00	1,809	3.68
7/10	12	45	50	203	0.38	1,759	3.26	0	0.00	9	0.02	2,085	3.86
7/14	12	42	45	210	0.42	1,656	3.29	1	0.00	4	0.01	1,963	3.89
7/21	12	41	45	44	0.09	887	1.80	18	0.04	7	0.01	440	0.89
7/24	12	37	40	23	0.05	588	1.32	33	0.07	9	0.02	315	0.71
7/27	12	33	33	26	0.07	419	1.06	68	0.17	6	0.02	162	0.41
7/31	12	31	31	20	0.05	300	0.81	364	0.98	4	0.01	92	0.25
8/02	12	34	35	26	0.06	256	0.63	891	2.18	6	0.01	92	0.23
8/04	12	31	33	17	0.05	208	0.56	878	2.36	0	0.00	36	0.10
8/07	12	30	32	15	0.04	178	0.49	812	2.26	2	0.01	16	0.04
8/09	12	31	33	18	0.05	135	0.36	2,163	5.81	2	0.01	45	0.12
8/11	12	28	29	15	0.04	80	0.24	2,550	7.59	5	0.01	25	0.07
8/14	12	32	38	11	0.03	122	0.32	2,374	6.18	3	0.01	62	0.16
8/16	12	37	43	6	0.01	110	0.25	2,557	5.76	3	0.01	14	0.03
8/18	12	46	51	8	0.01	96	0.17	3,864	7.00	4	0.01	6	0.01
8/21	12	60	66	7	0.01	239	0.33	3,459	4.80	3	0.00	127	0.18
8/23	12	53	57	7	0.01	88	0.14	3,417	5.37	2	0.00	6	0.01
8/25	12	55	62	1	0.00	90	0.14	3,590	5.44	1	0.00	4	0.01
8/28	12	65	68	8	0.01	74	0.09	2,235	2.87	4	0.01	2	0.00
8/30	12	57	58	4	0.01	68	0.10	1,483	2.17	7	0.01	2	0.00
9/01	12	45	51	1	0.00	57	0.11	1,092	2.02	1	0.00	1	0.00
9/08	12	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
----- NO BUYER -----													
Total	336	88	1,129	2,966	0.31	19,299	1.74	31,849	2.34	82	0.01	13,622	1.22
Average wt. (lbs)				17.7		7.09		8.57		4.06		7.26	

Table 11. Preliminary projections of the 1990 Alaska commercial salmon harvests in thousands of fish by management region and species.

Species	Management Region		Total
	Kuskokwim River	Kuskokwim Bay	Kuskokwim Area ^a
Chinook	19 - 56	16 - 42	35 - 98
Sockeye	41 - 137	13 - 58	54 - 195
Coho	222 - 660 ^b	77 - 206 ^b	299 - 866
Pink	0.8 - 11 ^b	13 - 29 ^b	14 - 40
Chum	199 - 1,380	13 - 83	212 - 1,463
Total	482 - 2,244	132 - 418	614 - 2,662

^a Except as noted all the projections are based on the previous (1984-89) average catches in all districts.

^b Kuskokwim Area pink and coho salmon have displayed a strong odd-even cycle in recent years. This projection is based on the even year catch for the previous 10 years.

Table 12. Number of buyers and fishermen participating in Kuskokwim Area Pacific herring fisheries, Alaska, 1981-1989.

<u>Year</u>	<u>District</u>	<u>Number of Buyers</u>	<u>Number of Fishermen</u>	<u>Number of Deliveries</u>
<u>1989</u>	Security Cove	8	104	108
	Goodnews Bay	6	138	533
	Cape Avinof	3	147	335
	Nelson Island	4	162	438
	Nunivak Island	3	45	210
<u>1988</u>	Security Cove	4	31	51
	Goodnews Bay	6	60	309
	Cape Avinof	1	98	485
	Nelson Island	7	174	547
	Nunivak Island	No commercial opening		
<u>1987</u>	Security Cove	8	65	67
	Goodnews Bay	4	117	191
	Nelson Island	9	235	633
	Nunivak Island	4	61	341
<u>1986</u>	Security Cove	11	88	199
	Goodnews Bay	5	104	319
	Nelson Island	4	163	1,099
	Nunivak Island	5	36	284
<u>1985</u>	Security Cove	6	107	268
	Goodnews Bay	5	83	420
	Nelson Island	6	143	776
	Nunivak Island	5	37	273
<u>1984</u>	Security Cove	4	38	86
	Goodnews Bay	4	130	390
<u>1983</u>	Security Cove	6	94	312
	Goodnews Bay	4	84	225
<u>1982</u>	Security Cove	3	107	250
	Goodnews Bay	3	84	297
<u>1981</u>	Security Cove	7	113	311
	Goodnews Bay	5	175	479

Table 13. Kuskokwim area Pacific herring proportion of biomass by age class, 1989.

District	Age (years)												Total Wt. (st)
	2	3	4	5	6	7	8	9	10	11	12	13+	
Commercial catch ^a													
Security Cove				2.3	10.1	8.7	25.1	16.6	17.0	15.2	4.7	0.7	554
Goodnews Bay				0.2	4.2	3.1	16.9	19.7	30.9	17.1	6.5	1.5	615
Cape Avinof				0.8	0.8	2.3	12.4	24.8	24.8	24.8	8.5	1.6	129
Nelson Island					0.4	3.0	9.9	12.9	32.8	24.6	13.8	2.6	232
Nunivak Island						0.9	8.6	12.9	31.9	31.0	12.9	1.7	116
All Districts				0.9	5.1	4.7	17.7	17.6	26.1	19.1	7.5	1.4	1646
Test Fishery ^b													
Security Cove				6.2	9.9	6.3	17.9	12.6	20.9	19.9	5.0	1.2	2276
Goodnews Bay		0.1	0.3	11.0	9.4	3.7	10.0	9.6	23.4	21.1	9.9	1.4	3429
Cape Avinof	0.2	1.2	2.4	13.7	9.9	11.3	14.5	11.5	17.1	11.2	7.0		2648
Nelson Island		0.1	0.8	6.8	6.3	4.5	13.8	13.3	22.1	20.7	9.8	1.8	3083
Nunivak Island			0.2	2.8	4.4	6.4	14.8	13.0	23.8	22.0	11.6	1.2	501
All Districts	0.1	0.3	0.8	9.3	8.6	6.2	13.7	11.7	21.2	18.6	8.4	1.2	11937

a Commercial drift gill net

b ADF&G variable mesh gill net

Table 14. Kuskokwim area Pacific herring age frequency by district, 1989.

District	Age (years)											Sample Size
	2	3	4	5	6	7	8	9	10	11	12+	
Commercial catch ^a												
Security Cove				3.4	13.0	9.2	26.6	15.5	15.5	12.6	4.3	207
Goodnews Bay				0.4	6.0	3.9	18.7	19.9	28.5	15.6	7.0	487
Cape Avinof				0.4	0.4	2.7	13.4	25.0	25.0	22.8	10.3	224
Nelson Island					0.8	3.2	11.3	13.7	32.3	23.5	15.1	371
Nunivak Island					0.2	0.9	9.7	13.3	32.5	29.9	13.5	452
All Districts				0.6	3.5	3.4	15.0	17.0	28.4	21.6	10.5	1741
Test Fishery ^b												
Security Cove				11.3	14.3	7.8	17.7	11.3	17.3	15.6	4.8	231
Goodnews Bay		0.2	0.8	21.4	13.7	4.4	9.5	8.1	18.3	15.6	8.1	641
Cape Avinof	0.9	3.5	4.4	21.8	13.2	11.7	12.0	8.8	12.0	7.3	4.4	317
Nelson Island		0.4	2.2	13.9	9.5	5.8	13.7	11.3	18.5	16.1	8.7	497
Nunivak Island		0.2	0.4	5.9	7.4	8.4	15.7	12.1	21.7	18.2	10.0	489
All Districts	0.1	0.7	1.5	15.2	11.3	7.0	13.1	10.2	18.1	15.1	7.8	2175

a Commercial drift gill net

b ADF&G variable mesh gill net

1. Vessel: 100' Ketchikan 100' Ketchikan
2. Commercial gear: 100' Ketchikan

VIT Districts	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	49.0	49.1	49.2	49.3	49.4	49.5	49.6	49.7	49.8	49.9	50.0	50.1	50.2	50.3	50.4	50.5	50.6	50.7	50.8	50.9	51.0	51.1	51.2	51.3	51.4	51.5	51.6	51.7	51.8	51.9	52.0	52.1	52.2	52.3	52.4	52.5	52.6	52.7	52.8	52.9	53.0	53.1	53.2	53.3	53.4	53.5	53.6	53.7	53.8	53.9	54.0	54.1	54.2	54.3	54.4	54.5	54.6	54.7	54.8	54.9	55.0	55.1	55.2	55.3	55.4	55.5	55.6	55.7	55.8	55.9	56.0	56.1	56.2	56.3	56.4	56.5	56.6	56.7	56.8	56.9	57.0	57.1	57.2	57.3	57.4	57.5	57.6	57.7	57.8	57.9	58.0	58.1	58.2	58.3	58.4	58.5	58.6	58.7	58.8	58.9	59.0	59.1	59.2	59.3	59.4	59.5	59.6	59.7	59.8	59.9	60.0	60.1	60.2	60.3	60.4	60.5	60.6	60.7	60.8	60.9	61.0	61.1	61.2	61.3	61.4	61.5	61.6	61.7	61.8	61.9	62.0	62.1	62.2	62.3	62.4	62.5	62.6	62.7	62.8	62.9	63.0	63.1	63.2	63.3	63.4	63.5	63.6	63.7	63.8	63.9	64.0	64.1	64.2	64.3	64.4	64.5	64.6	64.7	64.8	64.9	65.0	65.1	65.2	65.3	65.4	65.5	65.6	65.7	65.8	65.9	66.0	66.1	66.2	66.3	66.4	66.5	66.6	66.7	66.8	66.9	67.0	67.1	67.2	67.3	67.4	67.5	67.6	67.7	67.8	67.9	68.0	68.1	68.2	68.3	68.4	68.5	68.6	68.7	68.8	68.9	69.0	69.1	69.2	69.3	69.4	69.5	69.6	69.7	69.8	69.9	70.0	70.1	70.2	70.3	70.4	70.5	70.6	70.7	70.8	70.9	71.0	71.1	71.2	71.3	71.4	71.5	71.6	71.7	71.8	71.9	72.0	72.1	72.2	72.3	72.4	72.5	72.6	72.7	72.8	72.9	73.0	73.1	73.2	73.3	73.4	73.5	73.6	73.7	73.8	73.9	74.0	74.1	74.2	74.3	74.4	74.5	74.6	74.7	74.8	74.9	75.0	75.1	75.2	75.3	75.4	75.5	75.6	75.7	75.8	75.9	76.0	76.1	76.2	76.3	76.4	76.5	76.6	76.7	76.8	76.9	77.0	77.1	77.2	77.3	77.4	77.5	77.6	77.7	77.8	77.9	78.0	78.1	78.2	78.3	78.4	78.5	78.6	78.7	78.8	78.9	79.0	79.1	79.2	79.3	79.4	79.5	79.6	79.7	79.8	79.9	80.0	80.1	80.2	80.3	80.4	80.5	80.6	80.7	80.8	80.9	81.0	81.1	81.2	81.3	81.4	81.5	81.6	81.7	81.8	81.9	82.0	82.1	82.2	82.3	82.4	82.5	82.6	82.7	82.8	82.9	83.0	83.1	83.2	83.3	83.4	83.5	83.6	83.7	83.8	83.9	84.0	84.1	84.2	84.3	84.4	84.5	84.6	84.7	84.8	84.9	85.0	85.1	85.2	85.3	85.4	85.5	85.6	85.7	85.8	85.9	86.0	86.1	86.2	86.3	86.4	86.5	86.6	86.7	86.8	86.9	87.0	87.1	87.2	87.3	87.4	87.5	87.6	87.7	87.8	87.9	88.0	88.1	88.2	88.3	88.4	88.5	88.6	88.7	88.8	88.9	89.0	89.1	89.2	89.3	89.4	89.5	89.6	89.7	89.8	89.9	90.0	90.1	90.2	90.3	90.4	90.5	90.6	90.7	90.8	90.9	91.0	91.1	91.2	91.3	91.4	91.5	91.6	91.7	91.8	91.9	92.0	92.1	92.2	92.3	92.4	92.5	92.6	92.7	92.8	92.9	93.0	93.1	93.2	93.3	93.4	93.5	93.6	93.7	93.8	93.9	94.0	94.1	94.2	94.3	94.4	94.5	94.6	94.7	94.8	94.9	95.0	95.1	95.2	95.3	95.4	95.5	95.6	95.7	95.8	95.9	96.0	96.1	96.2	96.3	96.4	96.5	96.6	96.7	96.8	96.9	97.0	97.1	97.2	97.3	97.4	97.5	97.6	97.7	97.8	97.9	98.0	98.1	98.2	98.3	98.4	98.5	98.6	98.7	98.8	98.9	99.0	99.1	99.2	99.3	99.4	99.5	99.6	99.7	99.8	99.9	100.0	100.1	100.2	100.3	100.4	100.5	100.6	100.7	100.8	100.9	101.0	101.1	101.2	101.3	101.4	101.5	101.6	101.7	101.8	101.9	102.0	102.1	102.2	102.3	102.4	102.5	102.6	102.7	102.8	102.9	103.0	103.1	103.2	103.3	103.4	103.5	103.6	103.7	103.8	103.9	104.0	104.1	104.2	104.3	104.4	104.5	104.6	104.7	104.8	104.9	105.0	105.1	105.2	105.3	105.4	105.5	105.6	105.7	105.8	105.9	106.0	106.1	106.2	106.3	106.4	106.5	106.6	106.7	106.8	106.9	107.0	107.1	107.2	107.3	107.4	107.5	107.6	107.7	107.8	107.9	108.0	108.1	108.2	108.3	108.4	108.5	108.6	108.7	108.8	108.9	109.0	109.1	109.2	109.3	109.4	109.5	109.6	109.7	109.8	109.9	110.0	110.1	110.2	110.3	110.4	110.5	110.6	110.7	110.8	110.9	111.0	111.1	111.2	111.3	111.4	111.5	111.6	111.7	111.8	111.9	112.0	112.1	112.2	112.3	112.4	112.5	112.6	112.7	112.8	112.9	113.0	113.1	113.2	113.3	113.4	113.5	113.6	113.7	113.8	113.9	114.0	114.1	114.2	114.3	114.4	114.5	114.6	114.7	114.8	114.9	115.0	115.1	115.2	115.3	115.4	115.5	115.6	115.7	115.8	115.9	116.0	116.1	116.2	116.3	116.4	116.5	116.6	116.7	116.8	116.9	117.0	117.1	117.2	117.3	117.4	117.5	117.6	117.7	117.8	117.9	118.0	118.1	118.2	118.3	118.4	118.5	118.6	118.7	118.8	118.9	119.0	119.1	119.2	119.3	119.4	119.5	119.6	119.7	119.8	119.9	120.0	120.1	120.2	120.3	120.4	120.5	120.6	120.7	120.8	120.9	121.0	121.1	121.2	121.3	121.4	121.5	121.6	121.7	121.8	121.9	122.0	122.1	122.2	122.3	122.4	122.5	122.6	122.7	122.8	122.9	123.0	123.1	123.2	123.3	123.4	123.5	123.6	123.7	123.8	123.9	124.0	124.1	124.2	124.3	124.4	124.5	124.6	124.7	124.8	124.9	125.0	125.1	125.2	125.3	125.4	125.5	125.6	125.7	125.8	125.9	126.0	126.1	126.2	126.3	126.4	126.5	126.6	126.7	126.8	126.9	127.0	127.1	127.2	127.3	127.4	127.5	127.6	127.7	127.8	127.9	128.0	128.1	128.2	128.3	128.4	128.5	128.6	128.7	128.8	128.9	129.0	129.1	129.2	129.3	129.4	129.5	129.6	129.7	129.8	129.9	130.0	130.1	130.2	130.3	130.4	130.5	130.6	130.7	130.8	130.9	131.0	131.1	131.2	131.3	131.4	131.5	131.6	131.7	131.8	131.9	132.0	132.1	132.2	132.3	132.4	132.5	132.6	132.7	132.8	132.9	133.0	133.1	133.2	133.3	133.4	133.5	133.6	133.7	133.8	133.9	134.0	134.1	134.2	134.3	134.4	134.5	134.6	134.7
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Table 15. Kuskokwim Area Pacific herring commercial fishing periods summary by district, 1989.

<u>District</u>	<u>Period</u>	<u>Date</u>	<u>Time</u>	<u>Total hours</u>	<u>Harvest (st)</u>
Security Cove	1	5/17	0630-1030	4.0	553.6
			Total	4.0	553.6
Goodnews Bay	1	5/23	0630-1230	6.0	28.1
	2	5/23	2000-2400	4.0	11.6
	3	5/24	0730-1330	6.0	114.9
	4	5/25	0800-1600	8.0	278.9
	5	5/26	0900-1700	8.0	3.7
	6	5/27	0930-1730	8.0	5.8
	7	5/28	1030-1830	8.0	33.7
	8	5/29	1130-1930	8.0	139.1
			Total	50.0	615.6
Cape Avinof	1	6/04-6/12	1000-1200	194.0	128.8
			Total	194.0	128.8
Nelson Island	1	5/28	0600-0900	3.0	56.2
	2	5/29	1900-2200	3.0	102.9
	3	6/01	2000-2300	3.0	31.0
	4	6/03	1130-1530	4.0	32.0
	5	6/07	1600-1800	2.0	- ^a
			Total	15.0	232.2
Nunivak Island	1	5/22	1330-1530	2.0	1.4
	2	5/25	1200-1600	4.0	11.7
	3	5/27-6/03	1200-2400	180.0	103.1
			Total	186.0	116.2

a No buyers present

Table 16. Projections of Pacific herring spawning biomass and harvest for commercial fishing districts in the Kuskokwim Area, 1990.

District	1990 Projection ^a		Exploitation
	Biomass (st)	Harvest (st)	Rate (%)
Security Cove	1,530	235	15
Goodnews Bay	2,330	350	15
Cape Avinof	2,020	300	15
Nelson Island	2,050	- ^b	10 ^c
Nunivak Island	320	- ^b	10 ^c
Total	8,250	885	

^a Preseason projection. Projection may be adjusted based on inseason biomass estimates.

^b Projected biomass is below minimum for commercial harvest; fishery will not be opened if threshold biomass is not exceeded.

^c Maximum exploitation rate if in-season biomass estimate exceeds threshold level. Commercial harvest will be regulated so that the biomass of herring escaping the fishery will not fall below the threshold level for that fishery.



Kuskokwim Mangement Area District W-1 Kuskokwim River



Closed to Commercial Fishing
Closed to Substance Fishing
before, during, and after
commercial periods in district 1

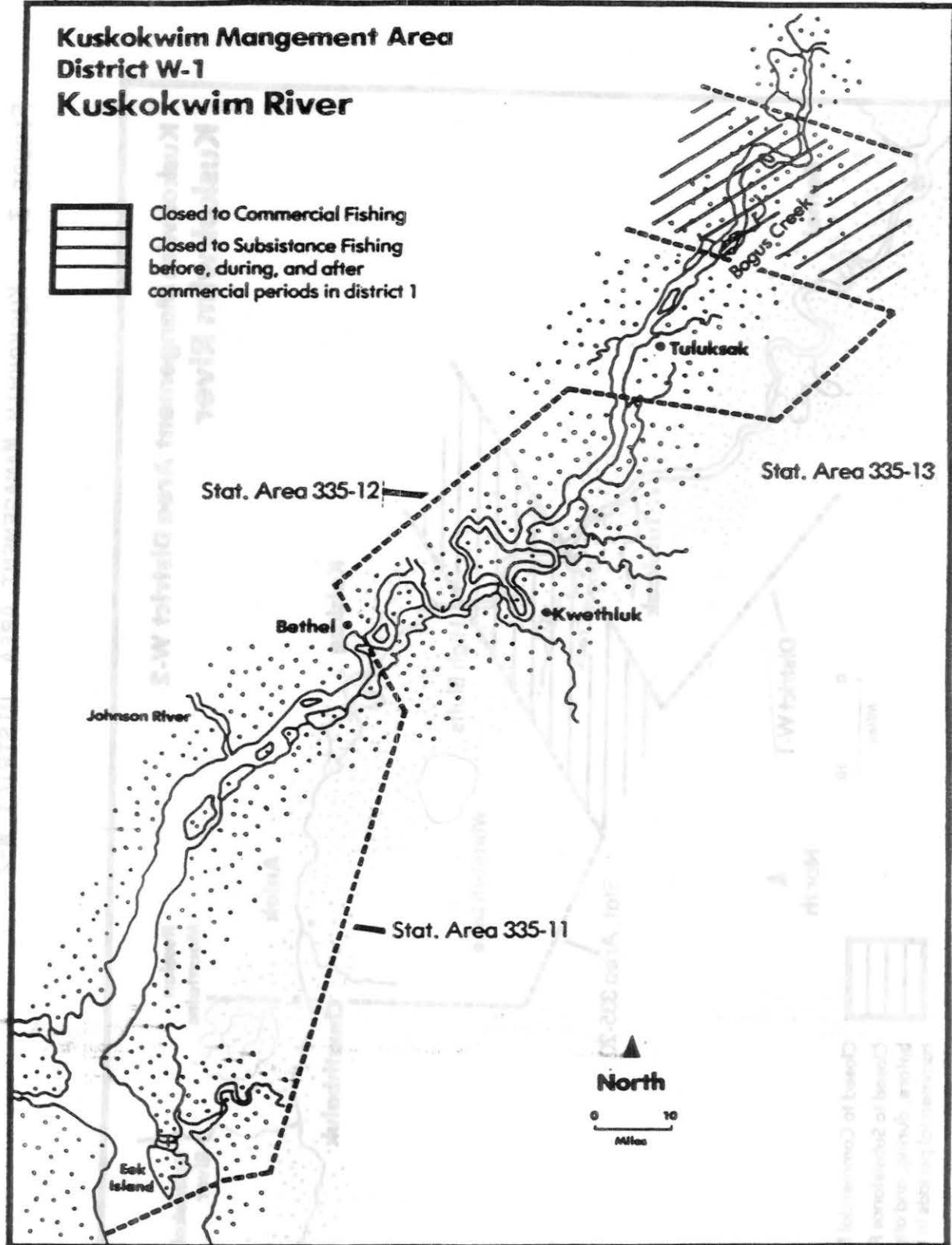
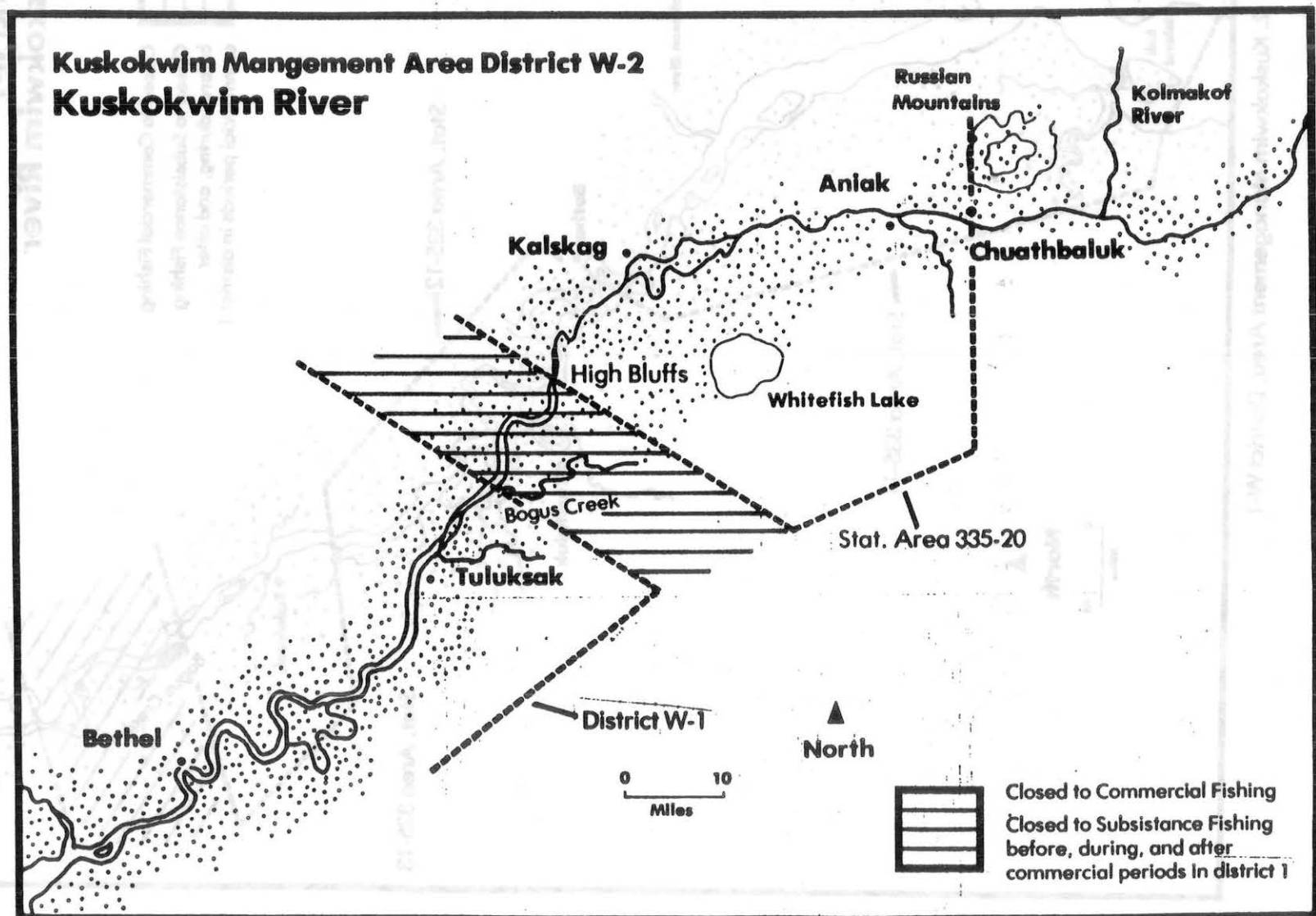


Figure 2. Kuskokwim Management Area, District W-1

FIGURE 3. KUSKOKWIM MANAGEMENT AREA, DISTRICT W-2



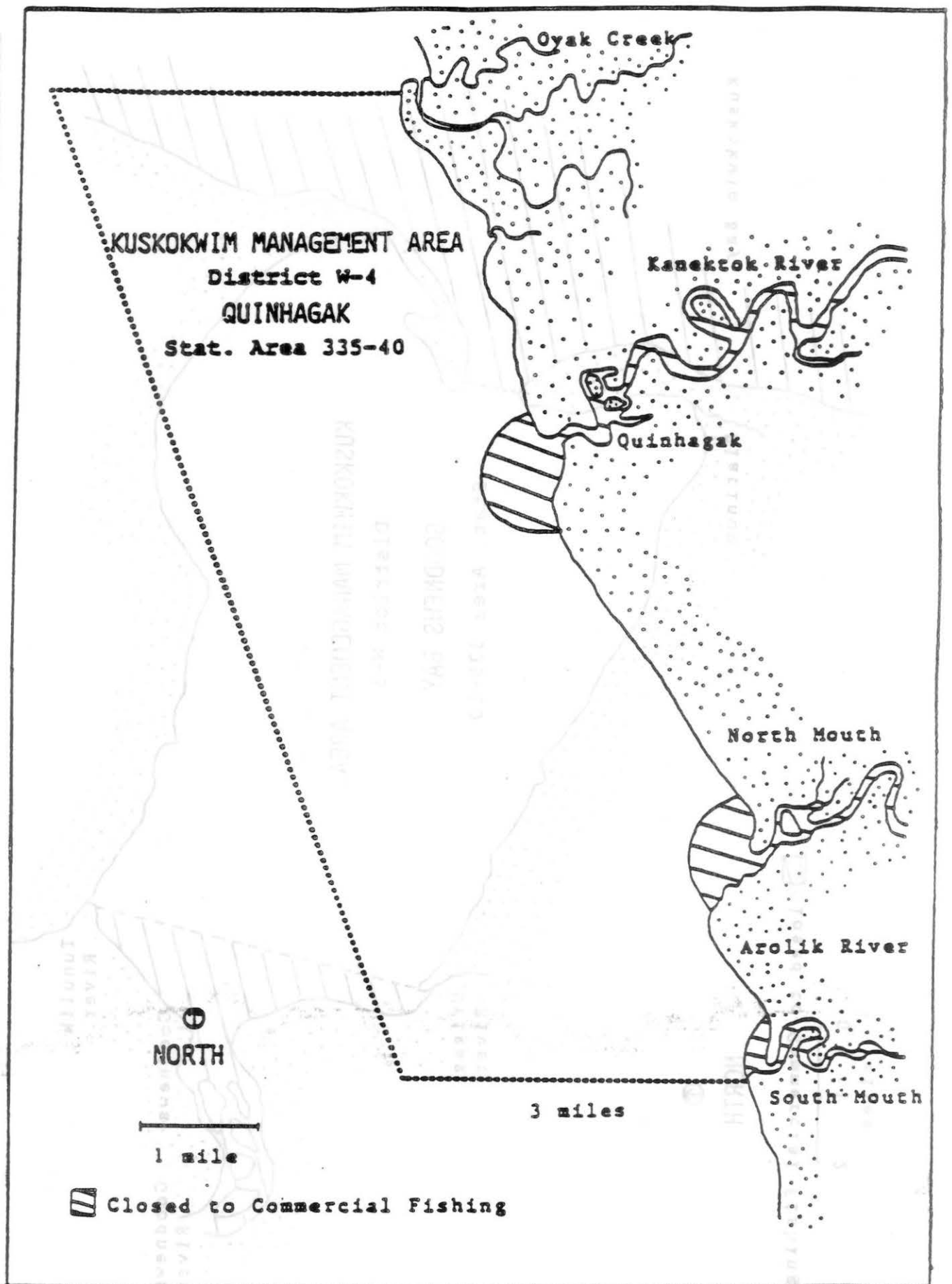


Figure 4. Kuskokwim Management Area District W-4, Quinhagak, 1987.

FIGURE 5. KUSKOKWIM MANAGEMENT AREA, TRICT W-5, GOODNEWS BAY

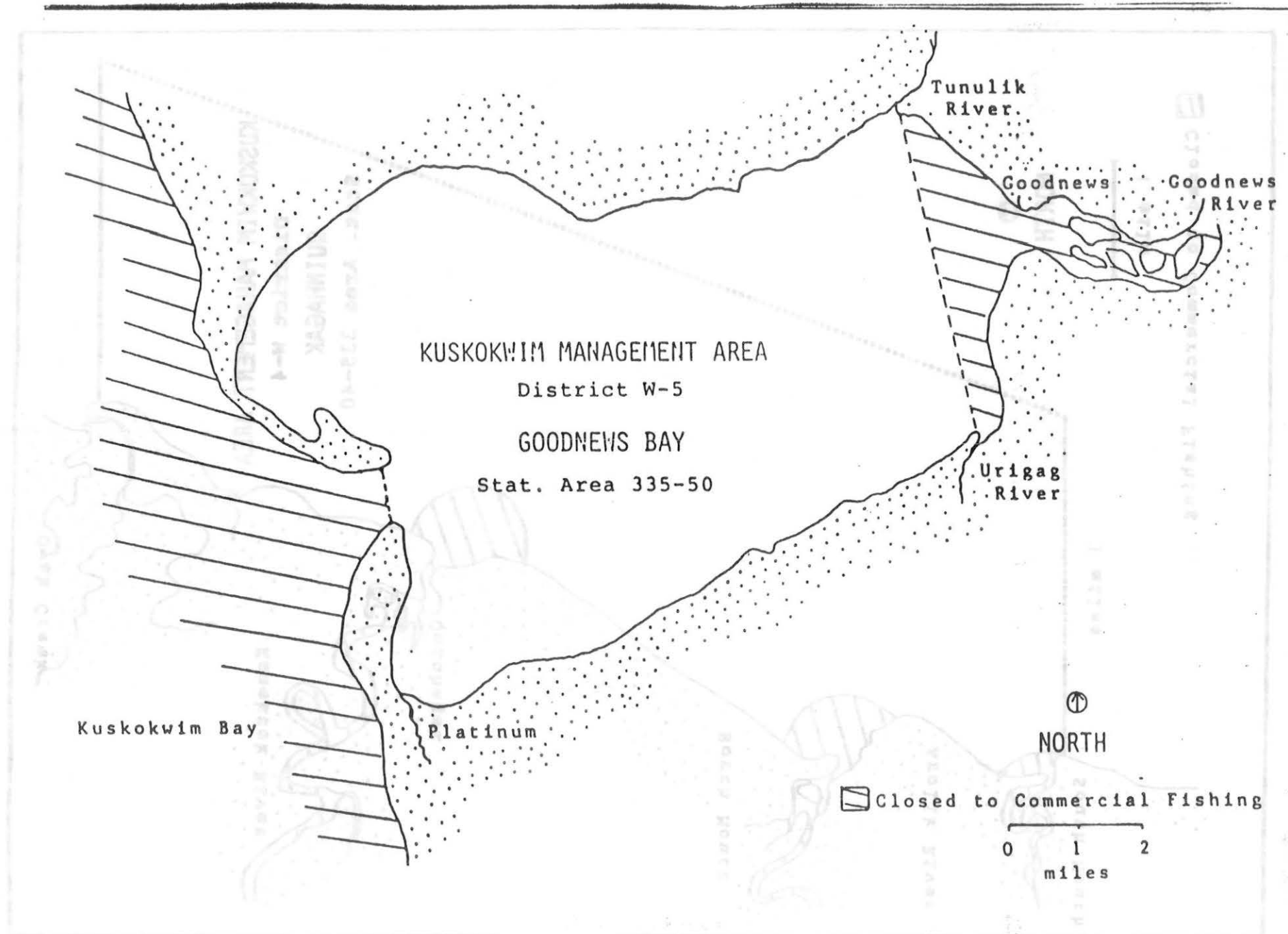


Figure 6

Kuskokwim drainage aerial chinook salmon escapements index

Kuskokwim River Aerial Index

CHINOOK SALMON 1975-1989

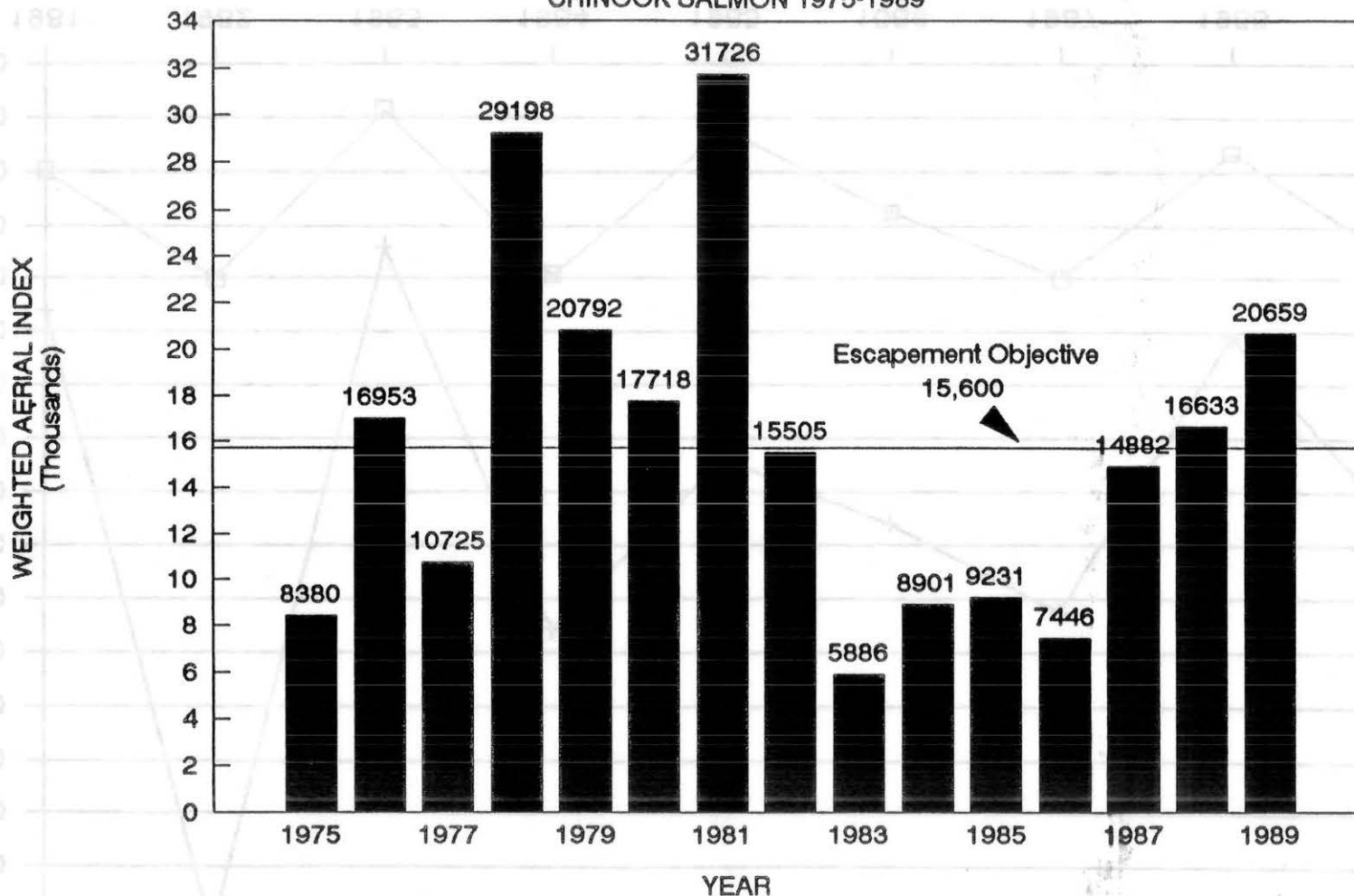
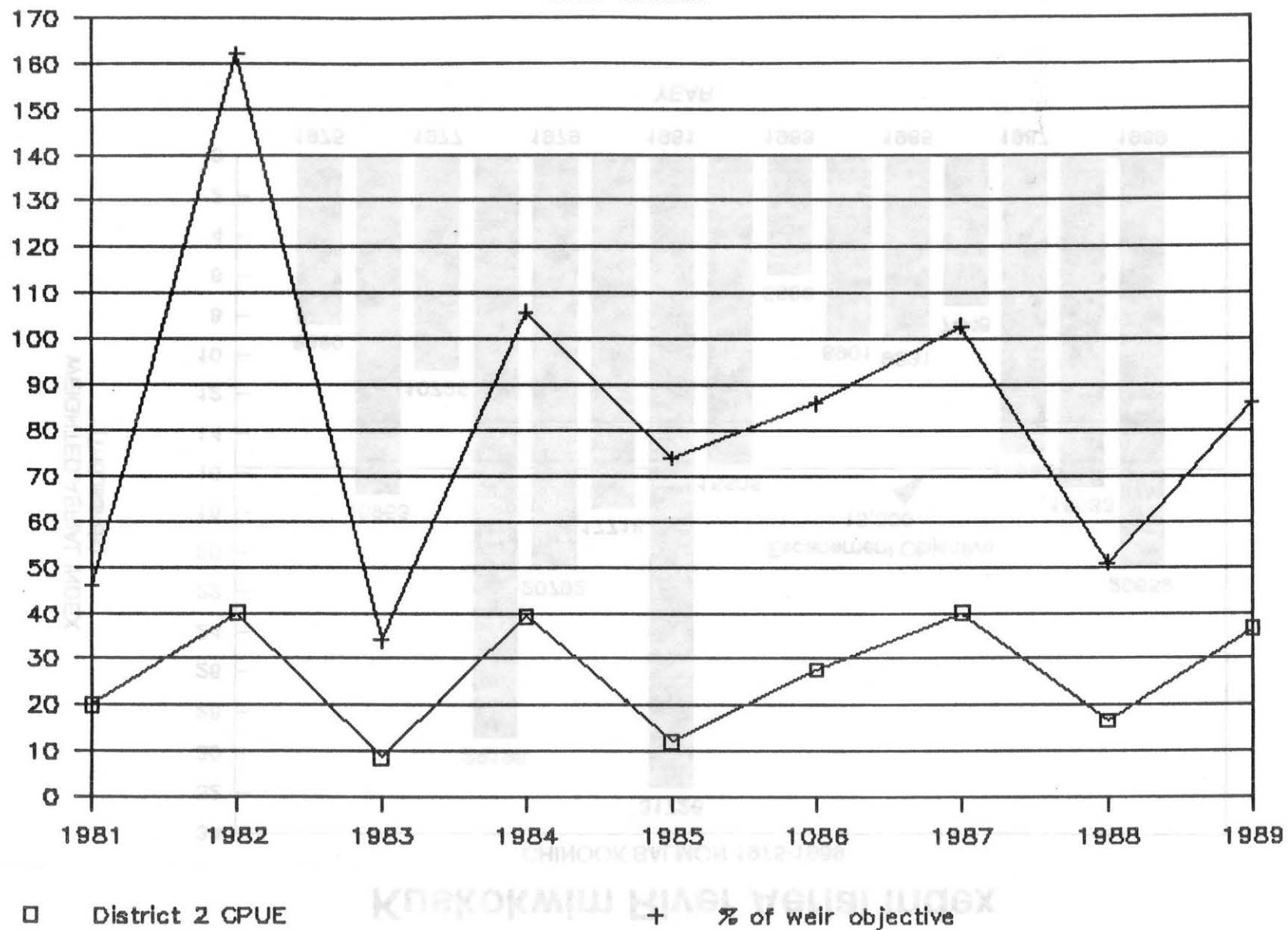


Figure 7. District 2 CPUE vs Escapement Index

Coho Salmon



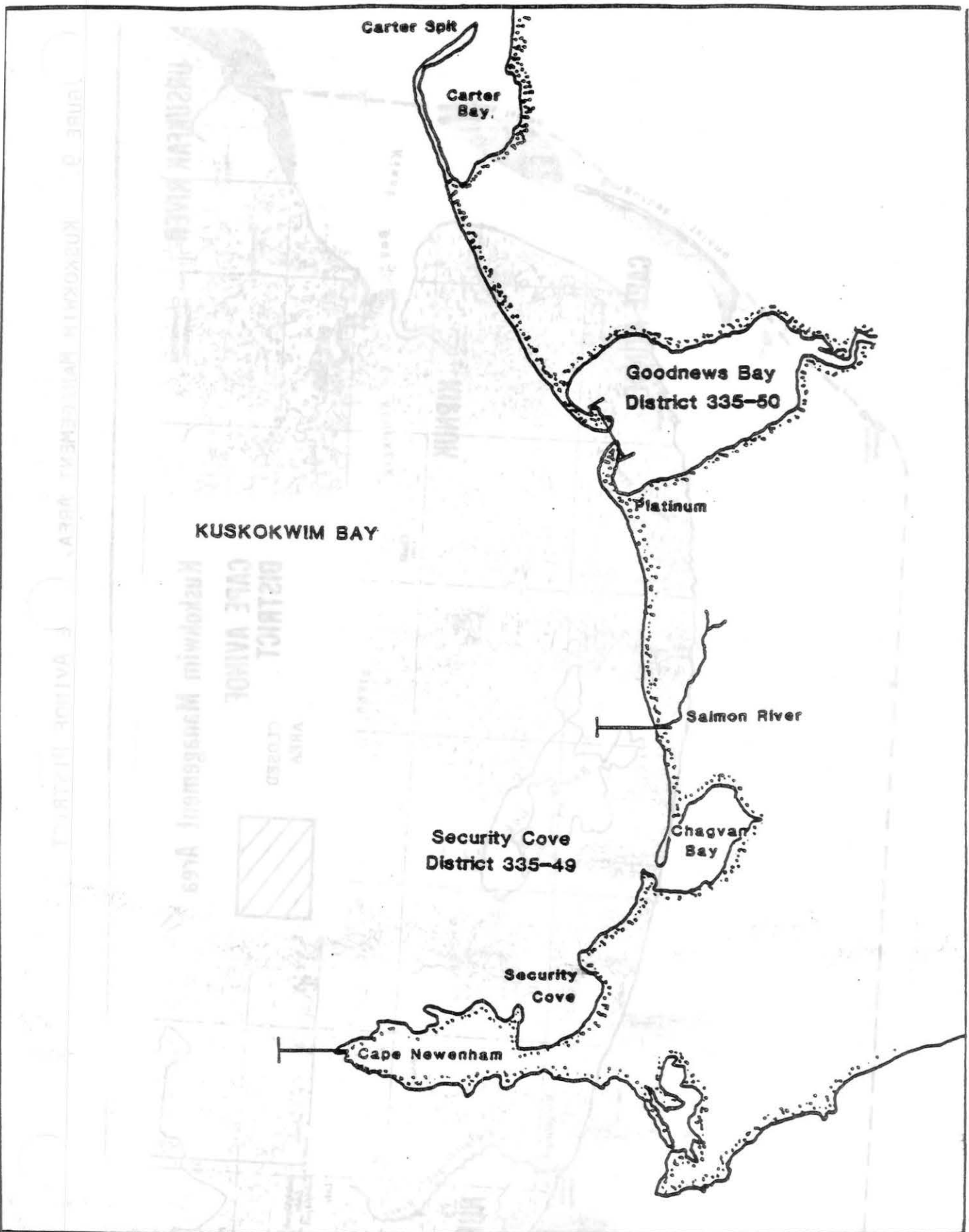


Figure 8. Kuskokwim Management Area, Security Cove and Goodnews Bay Districts.

FIGURE 9. KUSKOKWIM MANAGEMENT AREA, E AVINOF DISTRICT

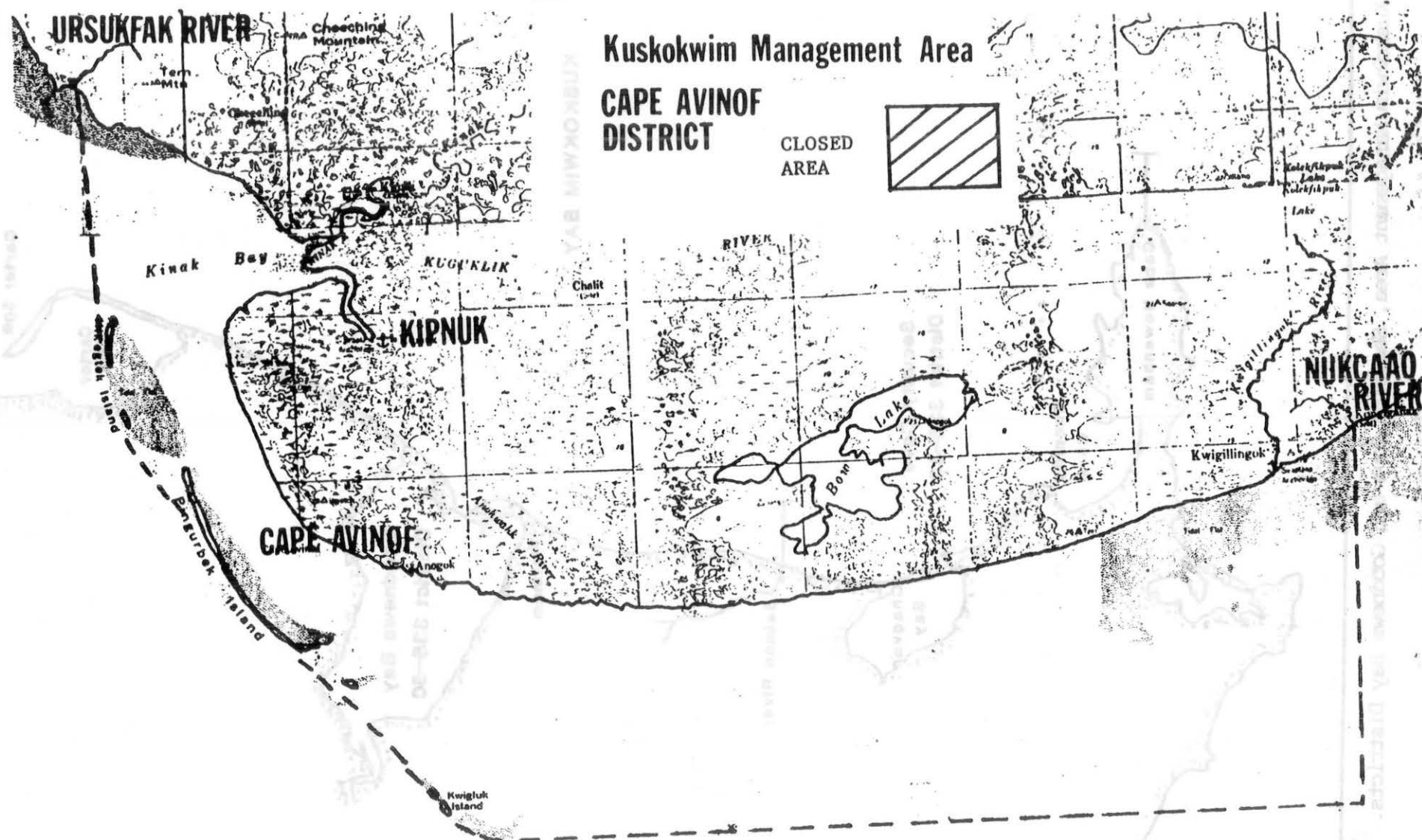
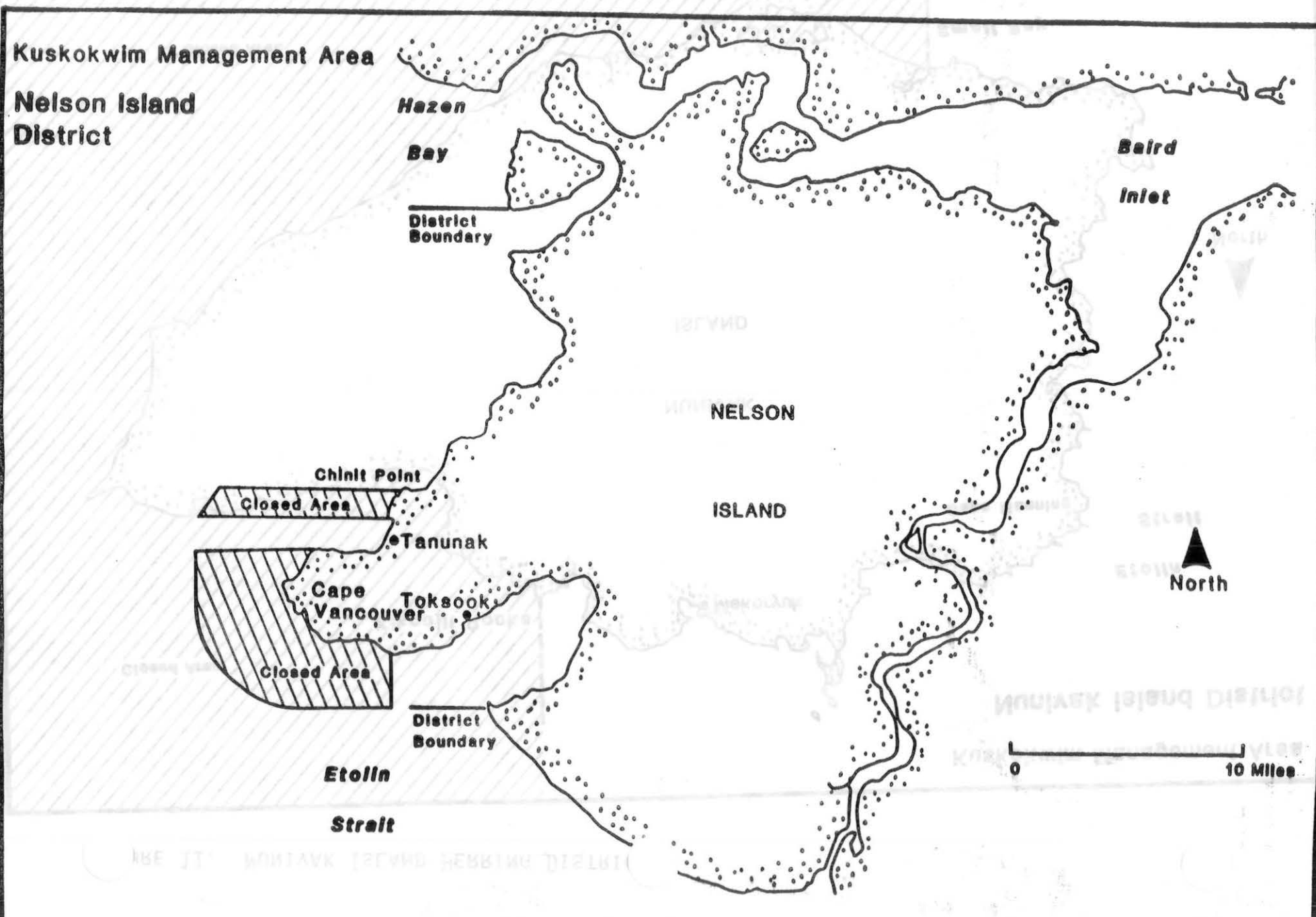
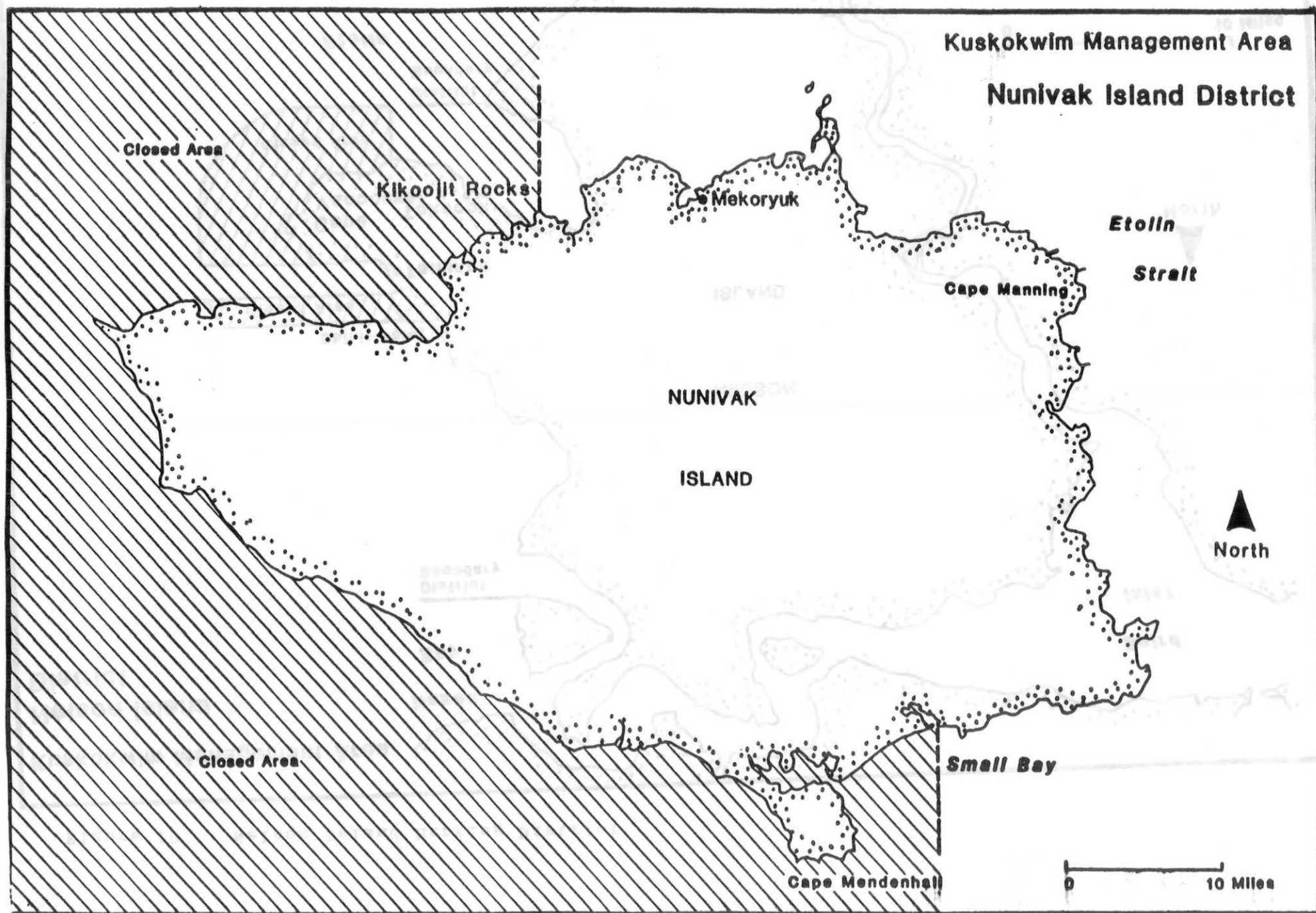


Figure 10. Nelson Island Herring District



IRE 11. NUNIVAK ISLAND HERRING DISTRICT



Percent of Total Run by Weight

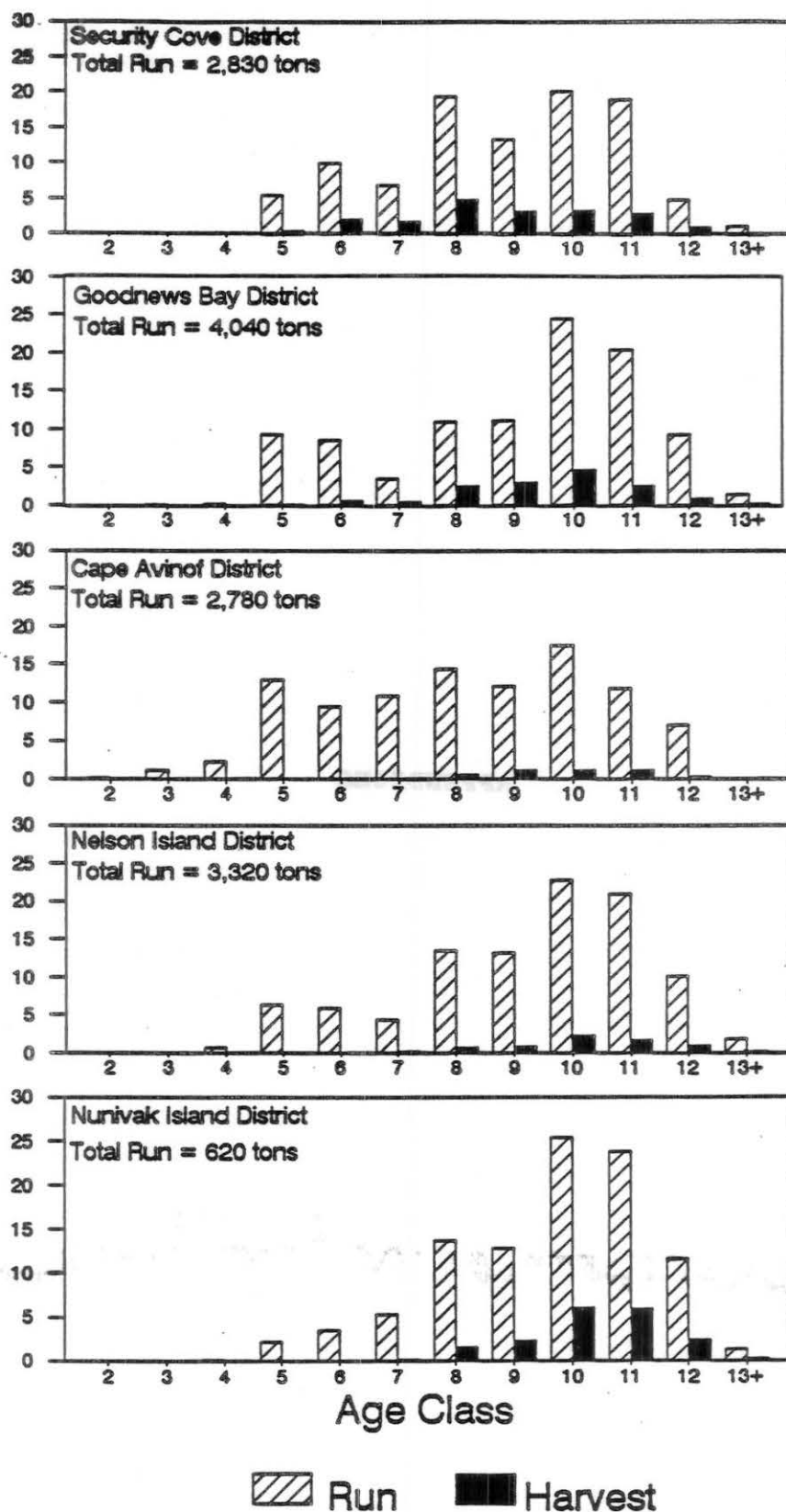
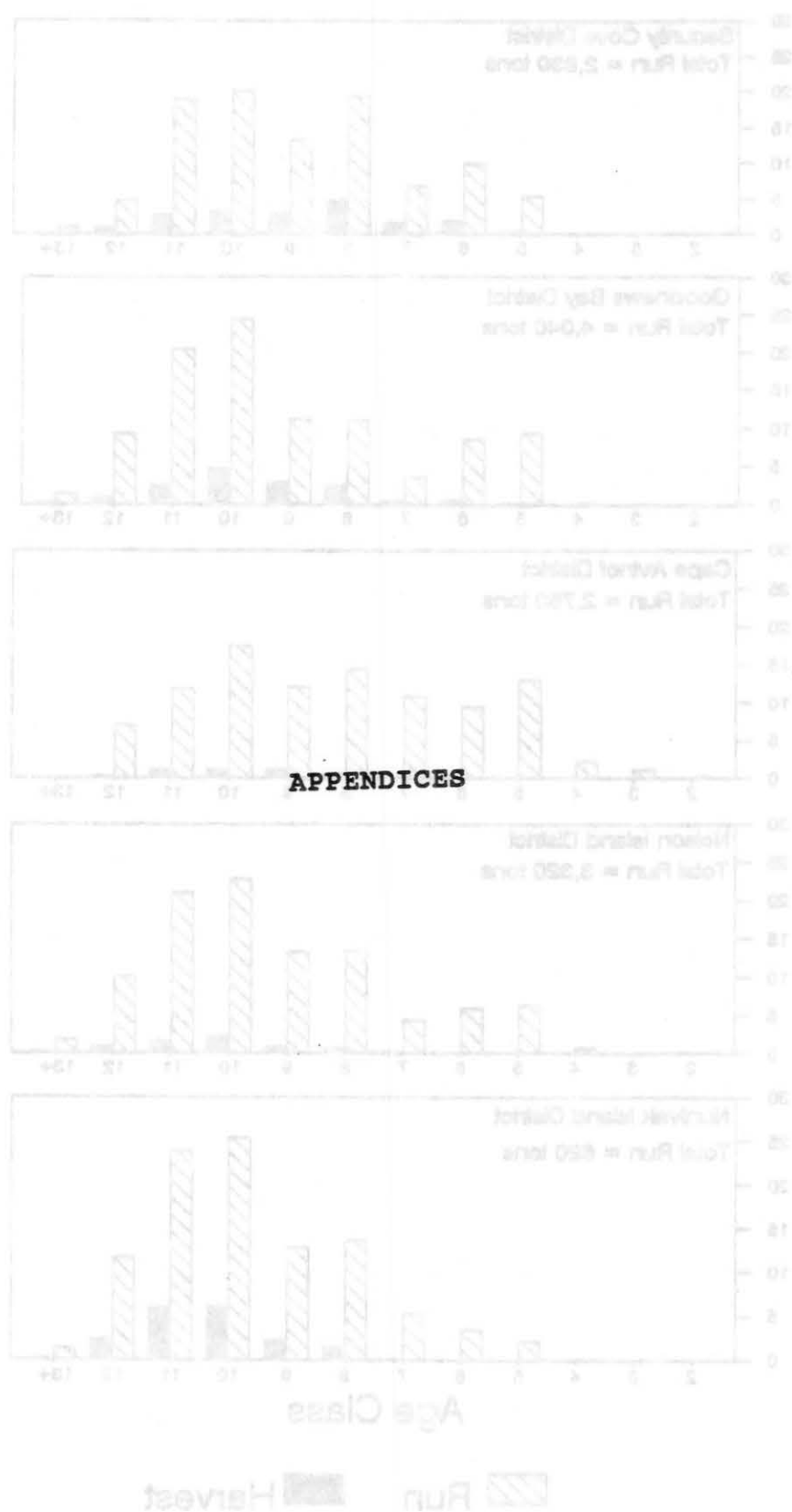


Figure 12. Age composition of Pacific herring in spawning populations and commercial harvest, Kuskokwim Area, 1989.

Figure 12. Age composition of Pacific herring in spawning populations and commercial harvest, Kushokwa Area, 1989.



Appendix A.I. Kuskoquim Area management index objectives for chinook, sockeye, coho and chin salmon.

Escapement Objectives			
	Chinook	Sockeye	Coho
KUSKOQUIM RIVER			
1. Kesteven River	1.0	-	-
a. 1-Step Mt. to Canyon Cr.	0.5	-	-
b. Canyon Creek	-	-	-
2. Klaskanin River	-	-	-
a. Attraction to Klaskanin Cr.	1.0	-	8.0
b. Klaskanin R. (upper to lower)	1.0	-	8.0
c. Klaskanin R. (Pog R. to Bear Cr.)	0.4	-	2.0
3. Aniak River	-	-	-
a. Buntarock R. to Aniak R.	1.5	-	10.0
b. Salmon River	1.5	-	4.0
c. Aniak Sonar Project	-	-	250.0
4. Holston River	-	-	-
a. Holston to Kaskadeigok	1.0	-	45.0
b. Kaskadeigok Weir	10.0	2.0	30.0
c. Salmon River (Piche Fork)	1.5	-	-
KUSKOQUIM BAY			
1. Kanakton River to Kaskadeigok Lake	3.8	32.0	30.5
2. Goodnews River System	-	-	-
a. Main Fork and Lake	15.0	15.0	17.0
b. Middle Fork and Lake	0.0	2.0	4.0
c. Middle Fork Lower Project	3.2	32.0	15.0

APPENDIX A

Escapement objectives in the hands of fish are preliminary and are subject to change as additional data becomes available. Unless otherwise indicated, escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when using standard survey methods under acceptable survey conditions.

1. Total Kuskoquim River escapement estimates.

2. Total Kuskoquim River escapement estimates.

3. Lower total escapement estimates.

Appendix A.1. Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon.

		Escapement Objectives ^a			
		Chinook	Sockeye	Coho	Chum
<u>KUSKOKWIM RIVER:</u>					
1.	Kwethluk River	1.0	-	-	7.0
	a. 3-step Mt. to Canyon Cr.	0.2	-	-	-
	b. Canyon Creek				
2.	Kisaralik River				
	a. Airstrip to Kisaralik L.	1.0	-	-	8.0
	b. Kasigluk R. (upper to lower)	1.0	-	-	8.0
3.	Tuluksak R. (Fog R. to Bear Cr.)	0.4	-	-	5.0
4.	Aniak River				
	a. Buckstock R. to Aniak L.	1.5	-	-	10.0
	b. Salmon River	1.6	-	-	3.0
	c. Aniak Sonar Project ^b	-	-	-	250.0
5.	Holitna River				
	a. Nogamut to Kashegegok ^c	2.0	1.0	-	49.0
	b. Kogrukluk Weir ^c	10.0	2.0	25.0	30.0
6.	Salmon River (Pitka Fork)	1.3	-	-	-
<u>KUSKOKWIM BAY:</u>					
1.	Kanektok River to Kagati Lake	5.8	32.0	25.0	30.5
2.	Goodnews River System				
	a. Main Fork and lakes	1.6	15.0	15.0	17.0
	b. Middle Fork and lakes	0.0	5.0	2.0	4.0
	c. Middle Fork Tower Project ^d	3.5	25.0	-	15.0

a Escapement objectives in thousands of fish are preliminary and are subject to change as additional data becomes available. Unless otherwise indicated, escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.

b Sonar total escapement estimates.

c Total Kogrukluk River escapement estimates.

d Tower total escapement estimates.

Appendix A.2. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964 - 1989.

<u>YEAR</u>	<u>GROSS VALUE OF CATCH TO FISHERMAN</u>	<u>PERMITS FISHED^a</u>	<u>AVERAGE INCOME</u>
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	12,514,492	811	15,431
1989	5,194,025	824	6,303
FIVE YEAR			
AVERAGE	\$6,542,100	791	8,224
(1984-1988)			

^a Permit holders who made at least one delivery. Information not available prior to 1983.

Appendix A.3. Kuskokwim Area commercial, subsistence, and personal use salmon catches, 1913-1989.

Year	COMMERCIAL CATCH					SUBSISTENCE CATCH			COMBINED TOTAL HARVEST
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Other*	Total
1913	7,800					7,800			7,800
1914		2,667				2,667			2,667
1915									
1916	949					949			949
1917	7,878					7,878			7,878
1918	3,055					3,055			3,055
1919	4,836					4,836			4,836
1920	34,853					34,853			34,853
1921	9,854					9,854			9,854
1922	8,944	6,120				15,064			15,064
1923	7,254					7,254			7,254
1924	19,253	900	7,167	7,167		34,487	17,700	203,148	220,848
1925	1,644	5,800				7,444	10,800	230,850	241,650
1926									738,576
1927									286,254
1928									481,090
1929									560,196
1930	7,626	2,448				10,074			538,650
1931	8,541					8,541			389,367
1932	9,339					9,339			746,415
1933							6,290	443,998	450,288
1934							20,800	597,132	617,932
1935	6,448		8,296			14,744	22,930	554,040	576,970
1936	624					624	33,500	549,423	582,923
1937	480					480			537,111
1938	624		828			1,452	10,153	400,242	410,395
1939	134					134	14,000	125,425	139,425
1940	247		500			747	8,000	415,523	423,523
1941	187		674			861	8,000	415,523	423,523
1942							6,400	325,339	331,739
1943							6,400	325,339	331,739
...									
1946	2,288		674			2,962			2,962
1947	5,356					5,356			5,356
...									
1951	4,210					4,210			4,210
...									
1954	57					57			57
...									
...									
1959	3,760					3,760			3,760
1960	5,969	5,649	5,498		3	17,119	18,752	301,753	320,505
1961	23,246	2,308	5,090	91	18,864	49,599	27,457	179,529	206,986

- Continued -

Year	COMMERCIAL CATCH						SUBSISTENCE CATCH				COMBINED		
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Coho ^c	Small ^d	Total	TOTAL HARVEST		
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,455	161,849	175,304	269,129	362,954		
1963	18,571		15,660			34,231	33,180	137,649	170,829	205,060	239,291		
1964	21,230	13,422	28,992	939	707	65,290	29,017	190,191	219,208	284,498	349,788		
1965	24,965	1,886	12,191		4,242	43,284	24,697		250,878	275,575	318,859		
1966	25,823	1,030	22,985	268	2,610	52,716	49,022		175,735	224,757	277,473		
1967	29,986	652	58,239		8,235	97,112	60,919		214,468	275,387	372,499		
1968	43,157	5,887	154,302	75,818	19,694	298,858	35,380		278,008	313,388	612,246		
1969	64,777	10,362	110,473	1,251	50,377	237,240	40,208		204,105	244,313	481,553		
1970	65,032	12,654	62,245	27,422	60,566	227,919	69,219	11,868	246,810	327,897	555,816		
1971	44,936	6,054	10,006	13	99,423	160,432	42,926	6,899	116,391	166,216	326,648		
1972	55,482	4,312	23,880	1,952	97,197	182,823	40,145	1,325	120,316	161,786	344,609		
1973	51,374	5,224	152,408	634	184,207	393,847	38,526	23,746	179,259	241,531	635,378		
1974	30,670	29,003	179,579	60,052	196,127	495,431	26,665	32,780	277,170	336,615	832,046		
1975	27,799	17,535	109,814	899	223,532	379,579	47,569		176,389	223,958	603,537		
1976	49,262	13,636	112,130	39,998	231,877	446,903	57,899	4,312	223,792	286,003	732,906		
1977	58,256	18,621	263,728	434	298,959	639,998	57,925	12,193	203,397	273,515	913,513		
1978	63,194	13,734	247,271	61,968	282,044	668,211	38,209	12,437	125,052	175,698	843,909		
1979	53,314	39,463	308,683	574	297,167	699,201	57,031		163,451	220,482	919,683		
1980	48,242	42,213	327,908	30,306	561,483	1,010,152	62,139	47,335	168,987	278,461	1,288,613		
1981	79,378	105,940	278,587	463	485,635	950,003	63,248	28,301	163,554	255,103	1,205,106		
1982	79,816	97,716	567,451	18,259	325,471	1,088,713	60,426	45,181	195,691	301,298	1,390,011		
1983	93,676	90,834	249,018	379	306,554	740,461	51,020	2,834	149,172	203,026	943,487		
1984	74,006	81,307	829,965	23,902	488,482	1,497,662	60,944	15,016	144,651	220,335	1,717,997		
1985	74,083	121,221	382,096	111	224,680	802,191	45,718	33,631	24,667	1,062	96,791	201,869	
1986	44,972	142,029	736,910	16,569	349,268	1,289,748	54,256		29,742		142,930 ^c	226,928	
1987	65,558	170,849	478,594	163	603,274	1,318,438	71,804	31,555	18,085	291	70,709	192,444	
1988 ^d	74,552	149,927	623,719	37,592	1,443,916	2,239,786	56,695	25,571	32,426		118,181	232,873	
1989 ^d	67,003	82,628	556,312	819	802,199	1,508,961	77,030	33,958	50,046		132,858	293,834	
Five Year Average (1984-1988)	66,634	133,067	610,257	15,667	621,924	1,429,565	57,883		23,987		133,074 ^c	214,890	1,663,046

^a Primarily chum and coho salmon.

^b Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimate attempted prior to 1988.

^c Includes sockeye, pink and chum salmon.

^d The personal use catch is included with the subsistence catch.

Appendix A.4. Historic salmon escapement data from current Kuskokwim Area projects, 1976 - 1989.

YEAR	Operating Period		SPECIES				
			Chinook	Sockeye	Coho	Pink	Chum
<u>KOGRUGLUK WEIR^a</u>							
1976	06/29 to 07/31		5,507	2,302	b	-	8,046
1977	07/14 to 07/27		2,548	2,238	b	2	21,746
1978	06/28 to 07/31		13,132	1,656	b	2	47,099
1979	07/01 to 07/24		11,063	2,589	b	1	15,277
1980	07/01 to 07/11		6,572	3,200	b	1	41,777
1981	06/27 to 10/25		16,075	17,702	11,532	6	56,495
1982	07/09 to 09/14		10,990	20,654	38,961	19	51,853
1983	06/22 to 07/02		3,009	1,147	8,327	-	8,997
1984	06/19 to 09/15		4,928	4,130	29,824	-	41,484
1985	06/29 to 09/07		4,307	4,223	16,536	-	15,002
1986	07/06 to 10/05		3,961	4,536	26,230	-	15,235
1987	08/09 to 09/23		b	b	24,238	-	b
1988	07/05 to 09/17		11,194	6,158	12,799	-	41,881
1989	07/07 to 07/14		11,940	5,810		-	39,548
	08/23 to 08/24				NA		
<u>ANIAK SONAR^c</u>							
1980	06/22 to 07/30		56,469	-	-	-	1,091,286
	08/16 to 09/12		-	-	81,556	-	-
1981	06/16 to 08/06		42,060	-	-	-	526,320
1982	06/21 to 08/01		33,864	-	-	-	389,226
1983	06/18 to 07/28		4,911	-	-	-	114,869
1984	06/16 to 07/30		-	-	-	-	275,261
1985	06/22 to 07/28		-	-	-	-	253,048
1986	06/26 to 07/24		-	-	-	-	209,080
1987	06/22 to 07/31		-	-	-	-	193,464
1988	06/23 to 07/31		-	-	-	-	401,511
1989	06/21 to 07/24		-	-	-	-	243,936
<u>MIDDLE FORK GOODNEWS RIVER TOWER^d</u>							
1981	06/13 to 08/15		3,688	49,108	357	1,327	21,827
1982	06/23 to 08/03		1,395	56,255	62	13,855	6,767
1983	06/11 to 07/28		6,027	25,816	d	34	15,548
1984	06/15 to 07/31		3,260	32,053	249	13,744	19,003
1985	06/27 TO 07/31		2,831	24,131	282	144	10,367
1986	06/16 TO 07/24		2,083	51,069	163	8,133	14,756
1987	06/22 to 07/30		2,274	28,871	62	62	17,519
1988	06/23 to 07/30		2,712	15,799	6	6,781	20,799
1989	06/29 to 07/31		1,915	21,186	145	246	10,380

a Pink salmon can pass through the Kogrukluk Weir.

b No count or incomplete count as project was not operated during the species' migration.

c Aniak sonar counts are adjusted to provide the total estimated escapements.

d Expanded estimates - the Goodnews River salmon counting tower's scheduled termination date precludes adequate assessment of the coho and pink salmon escapement.

Appendix A.5A. Lower Kuskokwim River, District 1, commercial effort
1970 - 1989.

	UNRESTRICTED	RESTRICTED	COHO SALMON				
<u>YEAR</u>	<u>MESH SEASON</u>	<u>MESH SEASON</u>	<u>SEASON</u>				<u>TOTAL</u>
1970	361	a	266				387
1971	418	216	83				422
1972	405	176	245				425
1973	456	341	411				530
1974	606	467	516				666
1975	472	540	533				737
1976	561	517	516				674
1977	563	522	572				653
1978	615	61	597				723
1979	591	617	613				685
1980	553	579	586				663
1981	589	613	586				679
1982	610	576	596				686
1983	544	619	577				679
1984	520	587	619				654
1985	b	598	627				654
1986	b	631	663				688
1987	b	680	694				703
1988	b	c	c				746
Number of Permits Landing Each Species							
	Chinook	Sockeye	Coho	Pink	Chum	Roe	
1989	695	688	732	261	719	22	745
Five Year Average (1984-1988)							689

a No commercial salmon season.

b No unrestricted mesh season.

c Fishery continued without interruption

Appendix A.5B Middle Kuskokwim River, District 2, commercial effort
1970 - 1989.

YEAR	UNRESTRICTED MESH SEASON	RESTRICTED MESH SEASON	COHO SALMON SEASON	TOTAL
1970	10	a	11	18
1971	22	a	a	22
1972	12	a	a	12
1973	28	a	a	28
1974	36	a	16	37
1975	38	a	a	38
1976	55	a	11	57
1977	83	54	24	105
1978	28	a	16	43
1979	41	a	20	43
1980	37	21	12	43
1981	153	11	16	153
1982	38	50	25	60
1983	14	42	9	43
1984	15	49	32	58
1985	b	17	16	23
1986	b	21	35	43
1987	b	24	20	29
1988	b	19	21	29
Number of Permits Landing Each Species				
	Chinook	Sockeye	Coho	Pink Chum Roe
1989	20	19	29	8 26 2
Five Year Average (1984-1988)				36

- a No commercial salmon season.
b No unrestricted mesh season.

Appendix A.6. Kuskokwim Area subsistence chinook salmon harvest by village, 1960 - 1989.

VILLAGE*	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
KIPNUK		248	11	123	75	8							0	0	
KWIGILLINGOK	250	35	43	106	339	8	250	957	70		220	200	10	75	
KONGIGANAK	h	h	h	h						385	891	41	0		
TUNTUTULIAK	226	2,226	842	2,853	1,826	1,575	3,097	3,462	2,214	2,195	3,558	1,841	3,214	2,859	1,577
EEK					f	f	2,921	4,572	2,566	2,038	2,065	1,882	1,969	1,981	2,356
KASIGLUK & EEK					1,857	3,123									
KASIGLUK	135	1,215	127	1,302	f	f	1,032	2,766	1,485	2,888	3,931	1,645	1,292	1,864	1,411
NUNAPITCHUK	683	2,042	848	1,874	636	490	2,213	1,926	1,750	2,279	4,680	1,978	2,496	2,663	1,165
ATMAUTLUAK	h	h	h	h	h	h	h	h	h	h	1,205	548	864	1,106	382
NAPAKIAK	1,830	2,573	2,191	3,148	2,677	2,872	3,658	3,895	2,468	3,546	4,960	1,868	2,009	1,763	1,224
NAPASKIAK	536	1,258	759	1,569	2,201	1,071	2,710	2,998	1,663	2,227	3,446	1,916	1,578	2,048	900
OSCARVILLE	1,968	282	75	309	339	688	322	1,127	393	457	542	570	196	586	180
BETHEL	1,923	4,150	1,378	7,019	4,114	3,371	8,046	13,925	6,205	7,472	17,026	8,731	8,371	8,898	4,631
KWETHLUK	2,692	3,763	2,329	5,050	3,262	2,887	6,551	6,993	2,848	3,187	7,932	5,564	5,137	3,444	2,694
AKIACHAK	1,626	3,052	1,800	2,533	3,488	3,685	4,904	5,543	3,755	2,602	7,022	4,818	3,872	2,592	1,726
AKIAK	1,865	3,159	906	2,869	2,495	1,345	3,670	3,660	1,822	1,275	3,290	2,688	1,899	1,895	1,292
TULUKSAK	737	1,486	493	1,295	572	1,021	1,576	1,709	1,048	1,131	1,995	1,280	1,318	1,322	883
LOWER KALSKAG	961	571	f	f	710	f	f	f	1,502	2,102	2,146	2,355	2,604	1,309	1,586
UPPER KALSKAG	667	1,049	f	f	1,143	f	f	f	1,619	1,623	734	601	401	938	463
KALSKAGS COMB.			805	2,661		1,395	3,379	3,567							
ANIAK	1,057	688	185	602	1,104	f	2,072	1,280	517	1,406	2,136	1,076	2,105	1,030	1,952
ANIAK*						642									
CHUATHBALUK*	64	54	10	30	74	f	139	217	34	180	219	179	261	942	674
NAPAIMUTE	20	16	44	52	134	8	78	60	94	19	22	17	20	13	6
CROOKED CREEK	747	518	561	859	1,358	374	1,446	585	77	541	684	291	183	269	650
GEORGETOWN							12		0	9	2	0	0	0	
RED DEVIL	f	40	f	f	f	f			111	142	232	135	182	138	205
SLEETMUTE	f	222	f	f	f	f	303	343	207	267	161	181	69	504	269
SLEETMUTE*	465	262	144	228	314	79			318	409	393	316	251	642	474
KASHEGELOK*							10								
STONY RIVER	435		31		299	79	636	303	176	2,187	105	402	95	287	439
LIME VILLAGE									0	50	15	2,119	0	0	
MCGRATH							300	25							
TAKOTNA															
MEDFRA															
NIKOLAI															
TELIDA															
QUINHAGAK								1,349	2,756						
GOODNEWS BAY															
PLATINUM															
TOTAL	18,752	27,457	13,455	33,180	29,017	24,697	49,022	60,919	35,380	40,208	69,219	42,926	40,145	38,526	26,665

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VILLAGE*	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
KIPNUK								60							134*
KWIGILLINGOK		75	382	75											
KONGIGANAK		122	361					52			235			468	1,307
TUNTUTULIAK	3,492	4,807	2,470	1,656	2,268	2,545	4,446	1,984	2,523	3,519	2,644	2,452	2,522	2,580	3,552
EEK	2,110	3,232	2,675	1,807	2,003	1,557	1,731	2,578	2,040		1,436			1,987	1,685
KASIGLUK	1,713	1,613	1,324	608	1,142	1,704	3,377	3,115			2,054			1,077	2,602
NUNAPITCHUK	2,092	2,578	2,622	2,178	2,109	2,612	2,918	2,577	2,688		2,019	3,410	3,372	1,664	3,087
ATMAUTLUAK	1,042	1,159	1,015	966	2,242	1,288	1,247	1,752			1,559			891	1,227
NAPAKIAK	2,864	3,330	2,702	2,140	2,191	2,582	3,017	3,500	2,047		1,805		2,760	1,960	3,785
NAPASKIAK	2,303	3,566	1,989	2,122	2,085	3,160	2,911	2,872			2,155		2,907	2,977	4,181
OSCARVILLE	891	623	672	349	629	477	495	523			916		745	415	1,200
BETHEL	11,688	13,215	9,408	6,905	11,564	12,591	15,367	13,516	8,492	11,066	6,940	11,984	8,107	11,671	19,214
KWETHLUK	3,179	4,193	5,563	3,172	6,919	7,627	6,167	5,897		6,732	4,937	5,824	8,779	7,543	7,388
AKIACHAK	3,534	4,915	5,407	2,951	4,818	5,405	3,094	4,468		5,588	3,254		4,871	5,613	5,438
AKIAK	2,837	3,076	2,880	1,850	3,567	3,355	2,386	2,745		3,413	2,975		3,683	3,235	4,562
TULUKSAK	1,338	1,411	2,906	1,906	1,489	2,807	2,446	2,220	1,671	2,286	2,749		3,712	2,720	3,781
LOWER KALSKAG	2,755	4,536	1,750	1,951	2,821	3,917	3,271	2,594		3,242	1,707	1,666		2,204	2,843
UPPER KALSKAG	1,752	1,413	2,813	1,253	1,590	1,889	1,171	963		657	605	587		693	1,256
ANIAK	1,391	1,490	4,991	1,331	2,634	2,750	3,102	2,071	3,174	1,847	1,828	4,624	2,131	2,258	2,860
CHUATHBALUK*	594	657	1,507	1,238	2,189	1,507	841	1,491			1,102			102	446
NAPAIMUTE	16	420	176	144	149	90	45	138			53			96	
CROOKED CREEK	238	264	619	488	728	654	512	515			218			481	427
GEORGETOWN			66	0		93									
RED DEVIL	623	195	324	153	488	255	298	273			176			175	156
SLEETMUTE	256	356	684	300	755	220	728	242		154	745			308	420
SLEETMUTE*	879	551	1,008	453	988	475					921				
KASHEGELOK*			h	156	233	92									
STONY RIVER	761	620	33	182	171	332	233	419			167			210	692
LIME VILLAGE	100	33	0		38									426	105
MCGRATH					581			160	830	730	59			253	519
TAKOTNA					65									150	62
MEDFRA							1	1	1	1	1	1			
NIKOLAI					60		500	778	750	795	615			150	706
TELIDA															1
QUINHAGAK			2,012	2,328	1,420	1,940	2,562	2,402	2,542	3,109	2,341	2,682	3,663	2,508	3,048
GOODNEWS BAY			574		228	498	1,309	1,185	1,004	597	399	513	640	289	414
PLATINUM					110	192	100	51	62	32	27	42	176	21	44
MEKORYUK															0
NEWTOK															10
NIGHTMUTE															0*
TOKSOOK BAY															450
TUNUAK															488

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Appendix A.7. Kuskokwim Area subsistence "small" salmon harvest by village, 1960 - 1989.

VILLAGE	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
KIPNUK		2,959	739	1,877	1,395	8									
KWIGILLINGOK	1,430	320	1,251	685	1,663	8	680	2,847	2,800		340	500	1,284	770	
KONGIGANAK										2,481	3,597	610		37	
TUNTUTULIAK	4,101	8,526	9,692	6,791	8,445	15,943	10,524	15,625	15,384	17,464	10,600	9,964	11,103	13,572	28,321
EEK					f	f	1,340	3,071	2,989	3,437	4,855	2,213	783	2,401	4,227
KASIGLUK & EEK					3,139	7,077									
KASIGLUK	1,400	3,657	1,705	1,020	f	f	1,762	2,309	5,251	3,308	5,731	2,043	1,934	6,090	6,773
NUNAPITCHUK	2,743	4,868	7,474	2,462	1,171	4,251	3,095	6,278	9,941	6,933	11,412	3,375	5,600	7,663	12,498
ATMAUTLUAK	1	1	1	1	1	1	1	1	1	1	1,191	1,197	947	2,818	4,585
NAPAKIAK	9,888	5,789	6,167	3,711	12,307	12,170	9,167	14,624	13,280	12,390	16,371	4,427	5,191	8,461	21,494
NAPASKIAK	5,199	4,286	5,546	3,584	6,275	25,969	9,090	8,325	12,526	12,237	11,169	7,039	8,858	8,478	20,467
OSCARVILLE	3,948	1,680	1,723	1,025	487	8,125	504	1,983	2,104	2,743	4,669	1,675	498	3,081	5,617
BETHEL	12,972	12,845	8,470	8,623	15,423	18,820	13,769	16,629	31,522	14,615	33,475	9,905	16,885	33,930	34,892
KWETHLUK	32,975	21,106	22,788	13,188	19,186	22,869	23,610	24,294	35,090	23,463	27,702	13,941	11,721	19,565	39,747
AKIACHAK	15,932	12,578	10,521	6,725	10,085	23,979	13,998	13,936	21,409	10,646	29,776	12,298	9,266	9,864	15,108
AKIAK	13,061	8,205	6,551	8,478	9,659	10,422	10,746	9,085	18,849	9,853	13,003	9,264	5,108	6,118	18,434
TULUKSAK	19,261	7,928	8,526	10,289	9,777	11,678	12,048	10,458	11,114	6,057	7,626	5,115	5,145	5,946	13,261
LOWER KALSKAG	11,563	7,764	f	f	9,472	f	f	f	8,483	10,621	11,158	3,509	3,490	2,873	12,265
UPPER KALSKAG	38,398	27,149	f	f	11,391	f	f	f	11,244	9,413	5,309	3,530	1,460	5,607	9,631
KALSKAGS COMB.			16,478	23,249		31,783	18,246	24,626							
ANIAK	36,673	15,935	10,120	10,608	17,874	f	12,930	16,158	19,221	15,126	10,030	4,933	5,243	13,547	9,305
ANIAK ^c						18,400									
CHUATHBALUK ^c	22,370	2,922	3,784	2,629	5,059	f	5,625	7,253	9,933	7,523	10,971	5,632	8,509	14,171	4,287
NAPAIMUTE	11,017	6,235	3,898	5,192	4,873	g	3,704	5,862	1,694	1,453	1,224	1,862	4,645	3,451	76
CROOKED CREEK	41,596	17,558	27,259	23,166	32,550	17,549	19,201	13,894	12,754	6,810	9,216	3,094	3,658	1,981	4,954
GEORGETOWN							70		2,030	3,664	800			10	
RED DEVIL	f	1,350	f	f	f	f			2,400	1,130	2,454	1,067	1,695	2,782	2,688
SLEETMUTE	f	6,884	f	f	f	f	4,319	6,951	11,773	8,258	4,464	3,203	4,293	2,168	4,212
SLEETMUTE ^d	16,926		9,007	5,367	5,706	9,380									
KASHEGELOK ^e							670								
STONY RIVER	1,700	2,642	1,855		4,254	12,463	3,956	9,488	12,808	12,080	8,407	2,293	3,000	3,875	4,328
LIME VILLAGE									1,200	2,400	1,260	3,702			
MCGRATH							1,000	50							
TAKOTNA															
MEDFRA								750							
NIKOLAI								900							
TELIDA															
QUINHAGAK								6,023	2,209						
GOODNEWS BAY															
PLATINUM															
TOTAL	301,753	179,529	161,849	137,649	190,191	250,878	175,735	214,468	278,008	204,105	246,810	116,391	120,316	179,259	277,170

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VILLAGE	1975	1976	1977	1978	1979	1980	1981	1982	1983 ⁿ	1984 ⁿ	1985	1986 ⁿ	1987	1988	1989
KIPNUK								280							682 ^{op}
KWIGILLINGOK		463	1,595	60											
KONGIGANAK		439	595					206			803			2,759	2,958
TUNTUTULIAK	7,429	8,390	9,109	5,563	5,300	8,305	5,873	8,500	3,585	5,103	5,934	3,075	6,381	5,699	6,061
EEK	2,754	3,637	1,286	1,055	625	743	1,188	1,012	1,441		644			1,751	1,433
KASIGLUK	3,708	4,044	3,504	1,242	2,179	5,172	2,983	6,876			5,337			3,797	3,790
NUNAPITCHUK	5,447	6,466	8,991	4,369	5,189	6,354	5,465	8,646	7,137		5,799	6,679	5,809	6,603	8,148
ATMAUTLUAK	2,524	3,361	3,319	3,720	5,170	4,405	2,663	4,787			5,774			4,219	5,114
NAPAKIAK	11,630	9,265	7,945	5,163	6,281	6,102	6,667	8,618	3,120		5,017		4,256	3,938	10,419
NAPASKIAK	12,930	21,380	11,588	8,376	5,251	7,391	7,290	10,139			6,991		9,031	10,879	13,632
OSCARVILLE	3,237	2,376	1,910	1,213	956	1,363	1,260	1,665			2,286		1,573	4,263	2,145
BETHEL	26,808	26,533	14,957	12,394	21,240	22,593	35,093	37,857	20,267	18,863	12,746	26,866	11,901	24,327	43,520
KWETHLUK	19,183	26,443	25,405	11,311	14,173	18,188	10,736	16,837		14,516	12,476	15,778	11,484	21,908	15,987
AKIACHAK	14,008	15,298	18,233	8,824	8,403	11,481	6,292	13,083		13,214	9,176		7,887	17,940	11,770
AKIAK	13,890	12,163	13,728	8,720	11,705	10,125	10,736	9,339		8,027	8,133		5,748	8,427	11,040
TULUKSAK	7,819	11,673	7,575	4,386	4,874	7,641	6,500	5,040	5,077	9,407	7,750		5,199	8,332	11,456
LOWER KALSKAG	9,823	17,158	7,886	3,508	8,659	7,903	3,894	6,925		8,886	5,728	3,734		10,921	5,565
UPPER KALSKAG	6,904	8,527	11,720	6,100	5,955	6,020	5,746	5,362		2,568	2,087	5,268		3,537	4,453
ANIAK	9,597	13,355	21,256	7,600	14,936	13,091	11,922	14,946	23,549	8,849	11,127	8,842	7,891	9,376	12,554
CHUATHBALUK ^c	561	7,824	4,976	4,725	5,513	2,202	8,460	6,952			5,590			1,698	2,814
NAPAIMUTE	226	1,636	4,892	1,886	2,057	2,531	684	2,392			552			159	
CROOKED CREEK	2,461	3,236	2,934	2,133	3,105	7,165	6,843	3,622			4,158			920	1,721
GEORGETOWN			1,095	0		1,042									
RED DEVIL	4,481	4,231	5,445	5,565	7,782	4,651	4,205	7,380			1,230			2,851	3,001
SLEETMUTE	5,767	7,571	5,111	2,771	1,200	1,670	7,520	2,936		2,208	5,084			5,378	3,598
KASHEGELOK [*]				4,580	5,239	6,207									
STONY RIVER	3,992	5,523	3,300	3,545	3,355	2,827	1,586	2,198			1,307			2,507	3,047
LIME VILLAGE	1,210	2,800			3,580									2,460	9,778 ^p
MCGRATH					5,398			53	2,900	2,450	792			821	2,955
TAKOTNA														300	290
MEDFRA							j	j	j	j	j	j			
NIKOLAI					2,711		3,700	4,360	2,600	5,100	2,900			3,227	1,506
TELIDA															75 ^a
QUINHAGAK			4,186	6,243	1,130	1,992	2,737	2,186	776	890	1,008	1,347	2,151	4,514	5,058 ^a
GOODNEWS		856			554	1,823	3,178	2,210	1,308	1,177	903	1,048	1,205	2,375	2,132 ^r
PLATINUM					528		333	544	210	42	151	86	328	90	359 ^r
MEKORYUK															8,675
NEWTOK															90
NIGHTMUTE															70 ^{op}
TOKSOOK BAY															1,356 ^p
TUNUNAK															307 ^a

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Appendix A.8. Mean salmon weights and prices paid to commercial fisherman in the Kuskokwim Area, 1967 - 1989.

Year	Mean Weight - Pounds					Average Price - \$/Pound				
	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	a	7.0	0.13	0.05	0.09	a	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971 ^b	26.2	6.9	6.1	a	6.4	0.17	0.10	0.13	a	0.08
1972	a	a	a	a	a	0.20	a	0.16	a	0.08
1973	a	a	a	a	a	0.25	a	0.26	a	0.19
1974	a	a	a	a	a	0.46	0.34	0.27	0.23	0.25
1975	a	a	a	a	a	0.54	a	0.31	a	0.26
1976 ^c	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	15.1	7.3	7.5	3.4	8.1	1.30	1.42	1.25	0.15	0.40
1989	16.6	7.2	7.3	3.4	6.8	0.75	1.20	0.55	0.05	0.26
Five Year Average (1984-88)	16.1	7.1	7.3	3.5	7.1	0.96	0.91	0.73	0.08	0.29

^a Information unavailable.

^b Information was not available for district 5.

^c Information was not available for district 4.

Based on American Fisheries Society Special Publication
No. 12, A List of Common and Scientific Names of Fishes
from the United States and Canada (Fourth Edition)
Committee and Names of Fishes, Bethesda, Maryland, 1980.

Appendix A.9. Fish species commonly found in the Kuskokwim Area^a.

Species Code	Genus and Species	Common Name
110	<i>Gadus macrocephalus</i>	Pacific Cod
113	<i>Eleginus gracilis</i>	Saffron Cod
121	<i>Platichthys stellatus</i>	Starry Flounder
122	<i>Liopsetta glacialis</i>	Arctic Flounder
127	<i>Limanda aspera</i>	Yellowfin Sole
128	<i>Parophrys vetulus</i>	English Sole
162	<i>Cottus cognatus</i>	Slimy Sculpin
166	<i>Oligocottus maculosus</i>	Tidepool Sculpin
192	<i>Hexagrammos stelleri</i>	Whitespotted Greenling
200	<i>Hippoglossus stenolepis</i>	Pacific Halibut
230	<i>Clupea harengus pallasii</i>	Pacific Herring
410	<i>Oncorhynchus tshawytscha</i>	Chinook Salmon
420	<i>Onchornynchus nerka</i>	Sockeye Salmon
430	<i>Onchornynchus kisutch</i>	Coho Salmon
440	<i>Onchornynchus gorbusha</i>	Pink Salmon
450	<i>Onchornynchus keta</i>	Chum Salmon
500	<i>Esox lucius</i>	Northern Pike
513	<i>Osmerus mordax</i>	Rainbow Smelt
514	<i>Hypomesus olidus</i>	Pond Smelt
516	<i>Mallotus villosus</i>	Capelin
520	<i>Salvelinus alpinus</i>	Arctic Char
532	<i>Salvelinus malma</i>	Dolly Varden (none anadromous)
541	<i>Onchornynchus mykiss</i>	Rainbow Trout
550	<i>Salvelinus namaycush</i>	Lake Trout
570	<i>Stenodus leucichthys</i>	Inconnu
581	<i>Coregonus nasus</i>	Broad Whitefish
582	<i>Coregonus pidschian</i>	Humpback Whitefish
583	<i>Coregonus sardinella</i>	Least Cisco
584	<i>Coregonus autumnalis</i>	Arctic Cisco
585	<i>Prosopium cylindraceum</i>	Round Whitefish
590	<i>Lota lota</i>	Burbot
600	<i>Lampetra tridentata</i>	Pacific Lamprey
601	<i>Lampetra japonica</i>	Arctic Lamprey
610	<i>Thymallus arcticus</i>	Arctic Grayling
630	<i>Dallia pectoralis</i>	Alaska Blackfish
640	<i>Catostomus catostomus</i>	Longnose Sucker
660	<i>Gasterosteus aculeatus</i>	Threespine Stickleback
661	<i>Pungitius pungitius</i>	Ninespine Stickleback
670	<i>Percopsis omiscomaycus</i>	Trout Perch
NA	<i>Megalocottus platycephalus</i>	Belligerent Sculpin
NA	<i>Myoxocephalus quadricornis</i>	Fourhorn Sculpin

^a Based on American Fisheries Society Special Publication No. 12, A List of Common and Scientific Names of Fishes from the United States and Canada (Fourth Edition). Committee and Names of Fishes, Bethesda, Maryland, 1980.

Appendix A.10. Kuskokwim River distances^a.

	Distance from the Mouth		Distance from Bethel	
	Kilometer	Miles	Kilometer	Miles
Popokamiut				
(Lower boundry District 1)	-3	-2	-129	-80
Kuskokwim River Mouth				
60.80 N, 162.42 W	0	0	-125	-78
Eek Island, Southernmost tip,				
(Lower boundry District 1)	19	12	-106	-66
Apokak Slough				
(Lower boundry District 1)	35	22	-90	-56
Eek River	39	24	-87	-54
Kwegooyuk	42	26	-84	-52
Kinak River	48	30	-78	-48
Tuntutuliak Village	56	35	-87	-54
Kialik River	59	37	-66	-41
Fowler Island	83	52	-42	-26
Johnson River	93	58	-32	-20
Napakiak Village	104	65	-21	-13
Napaskiak Village	115	71	-12	-7
Oscarville Village	115	71	-11	-7
Bethel City	125	78	0	0
Gweek River	145	90	20	12
Kwethluk Village	159	99	34	21
Akiachak Village	169	105	43	27
Kasigluk River	173	108	48	30
Kisaralik River	175	109	50	31
Akiak Village	190	118	64	40
Mishevik Slough,	212	132	87	54
Tuluksak Village	218	136	93	58
Bogus Creek				
(Boundry of District 1)	234	146	109	68
High Bluffs				
(Boundry of District 2)	264	164	139	86
Mud Creek Slough	297	185	172	107
Kalskag Village	309	192	184	114
Aniak Village, Aniak River	362	225	237	147
Chuathbaluk Village	375	233	250	155
(Upper boundry District 2)				
Kolmakof River	395	246	270	168
Napamiut Village	410	255	285	177
Holokuk River	415	258	290	180
Oskawalik River	449	279	324	201
Crooked Creek Village	466	290	341	212
Georgetown Village,				
George River	497	309	372	231
Red Devil Village	526	327	401	249
Sleetmute village	539	335	414	257
Holitna River	540	336	415	258

-continued-

	Distance from the Mouth		Distance from From Bethel	
	Kilometer	Miles	Kilometer	Miles
Stony River Village	585	364	460	286
Stony River	587	365	462	287
Swift River	611	380	486	302
Tatlawiksuk River	616	383	491	305
Devil's Elbow	645	401	520	323
Vinasale	740	460	615	382
McGrath Village	815	507	690	429
Middle Fork	889	553	764	475
Big River	801	560	776	482
Pitka Fork	920	572	795	494
Medra Village	928	577	803	499
South Fork	931	579	806	501
East Fork	943	586	818	508
North Fork	943	586	818	508
Nikolai Village	999	621	874	543
Swift Fork	1,136	706	1,011	628
Telida Village	1,184	736	1,059	658
Highpower Creek	1,200	746	1,075	668
Fish Creek	1,284	798	1,159	720
North Fork Lake	1,334	829	1,209	751
Top of Kuskokwim Drainage	1,498	931	1,373	853

- a These distances were taken from the USGS 1:36,300 series of topographic maps. The "mouth" was defined as the point where the "grassland" banks are 24 miles apart. Some locations are not on the mainstem of the Kuskokwim River, as a result their mileages appear to be out of sequence since they are listed in the order of the turn off.

Appendix A.11. Kuskokwim area district transfers, 1987-1989.

DISTRICT W-1 HOME

	1987	1988	1989
To W-2:	8	5	13
To W-4:	35	143	127
To W-5:	7	23	23

DISTRICT W-2 HOME

	1987	1988	1989
To W-1:	12	10	11
To W-4:	0	1	2
To W-5:	0	1	0

DISTRICT W-4 HOME

	1987	1988	1989
To W-1:	157	34	48
To W-2:	6	0	0
To W-5:	10	44	11

DISTRICT W-5 HOME

	1987	1988	1989
To W-1:	40	6	1
To W-2:	1	0	0
To W-4:	44	16	10

Total 1989 transfers: 256
 Total 1988 transfers: 283
 Total 1987 transfers: 320

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Appendix A.11. Kuskokwim area district transfers, 1987-1989

DISTRICT W-1 HOME				DISTRICT W-2 HOME			
1987	1988	1989		1987	1988	1989	
To W-1	8	2	13	To W-1	13	10	11
To W-2	32	143	123	To W-2	0	1	2
To W-3	1	23	23	To W-3	0	1	0
Total 1989 transfers: 326				Total 1989 transfers: 326			
Total 1988 transfers: 283				Total 1988 transfers: 283			
Total 1987 transfers: 350				Total 1987 transfers: 350			

APPENDIX B

Appendix B.1. Associated environmental and catch data,
Bethel, Kuskokwim River, 1965-1989^a.

YEAR	RIVER	RIVER	FIRST REPORTED		RIVER
	BREAKUP	CLEAR OF ICE	Chinook Salmon	Smelt	FREEZE-UP
1965	b	b	May 31	May 25	b
1966	June 01	b	June 1 ^c	June 06	Oct. 20
1967	May 06	May 17	May 20	May 25	Oct. 19
1968	May 14	May 17	May 26	b	b
1969	May 06	May 13	May 23	b	b
1970	May 12	May 16	May 21	May 27	Oct. 18
1971	May 24	May 29	June 06	June 07	Nov. 04
1972	May 23	May 28	June 05	June 06	Nov. 03
1973	May 14	May 18	May 27	May 31	Oct. 15
1974	May 07	May 19	May 23	May 25	b
1975	May 19	May 25	May 26	May 29	Oct. 29
1976	May 18	May 18	June 01	b	Oct. 27
1977	May 23	June 01	May 31	June 02	Oct. 18
1978	b	b	May 18	May 22	Oct. 25
1979	Apr 27	May 07	May 16	b	Nov. 19
1980	May 04	May 10	May 17	May 22	b
1981	May 09	May 12	May 22	May 06	b
1982	May 18	May 22	June 01	June 03	Oct. 30
1983	May 11	May 13	May 23	June 01	Oct. 22
1984	May 13	May 23	May 27	May 27	Oct. 18
1985	May 25	May 29	June 03	June 04	Oct. 22
1986	May 11	May 18	May 28	May 28	Oct. 24
1987	May 17	May 20	May 25 ^d	May 31	Nov. 06
1988	May 11	May 15	May 16	b	Nov. 14
1989	May 05	May 07	May 26	May 28	Oct. 31

a Environmental data, breakup, clear of ice and freeze-up
from National Weather Service

b Data not available

c Caught at Kalskag

d Also first chum

Appendix B.2. Comparative chinook salmon catches by fishing period
by year in District 1, Lower Kuskokwim River,
1974 - 1989^a.

YEAR	DATE	CATCH	NUMBER OF FISHERMEN	HOURS	CATCH PER HOUR (CPUE)
1974	June 10-11	4,384	422	5,064	0.90
	June 13-14	5,790	488	5,957	1.00
	June 17-18	5,857	506	6,072	1.00
Subtotal ^b		16,031	606	16,992	0.90
	June 27	558	267	1,602	0.40
	July 01-02	561	380	4,560	0.08
	July 04-05	196	282	3,384	0.06
	July 08-09	286	376	4,512	0.06
	July 18	31	190	1,140	0.03
Total		17,663	666	32,190	0.50
1975	June 16	359	12	72	5.00
	June 19-20	1,031	46	552	1.90
	June 23-24	17,235	483	5,796	2.90
Subtotal ^b		18,625	541	6,420	2.90
	June 30	691	279	1,674	0.40
	July 03	636	360	2,160	0.30
	July 07	421	369	2,214	0.20
	July 10	195	304	1,824	0.10
	July 14	179	326	1,956	0.10
Total		20,747	539	16,248	1.20
1976	June 17	6,962	459	2,754	2.50
	June 21	13,048	495	2,970	4.40
Subtotal ^b		20,010	561	5,724	3.40
	June 28	4,143	348	2,088	2.00
	July 01	1,550	415	2,490	0.60
	July 08	894	381	2,286	0.40
	July 12	377	344	2,262	0.20
	July 15	236	265	1,590	0.10
Total		27,177	517	16,440	1.70

- Continued -

Appendix B.2. (page 2 of 6)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1977	June 15	12,458	467	2,802	4.50
	June 20	16,227	484	2,904	5.60
Subtotal ^b		28,685	563	5,706	5.00
	June 27	1,337	378	2,268	0.60
	June 30	504	409	2,454	0.20
	July 04	266	331	1,986	0.10
	July 07	407	368	2,208	0.20
	July 14	153	385	2,310	0.06
Total		31,352	653	16,932	1.80
1978	June 09	7,590	509	3,054	2.50
	June 14	6,142	266	1,596	3.90
	June 16	12,341	396	2,376	5.20
	June 22	1,724	72	288	6.00
	June 23	8,342	429	1,716	4.90
Subtotal ^b		36,139	615	9,030	4.00
	June 26	1,964	499	2,694	0.70
	June 29	1,759	422	2,652	0.70
	July 03	894	476	2,856	0.30
	July 06	1,460	485	5,820	0.30
	July 10	694	428	5,136	0.10
	July 10	293	422	2,532	0.10
Total		43,203	617	30,720	1.40
1979	June 11	12,270	523	3,138	3.90
	June 15	12,363	549	3,294	3.80
Subtotal ^b		24,633	591	6,432	3.80
	June 22	5,651	502	3,012	1.90
	June 26	2,277	531	3,186	0.70
	June 29	1,583	542	3,252	0.30

- Continued -

Appendix B.2. (page 3 of 6)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1979	July 03	1,233	542	3,252	0.40
	July 10	470	520	3,120	0.20
Total		35,847	617	22,254	1.60
1980	June 12	9,891	469	2,814	3.50
	June 18	16,921	468	2,808	6.00
Subtotal ^b		26,812	553	5,622	4.80
	June 23	4,777	426	2,616	1.80
	June 26	1,460	408	2,448	0.60
	July 02	498	383	2,298	0.20
	July 09	445	431	2,586	0.20
Total		33,992	597	15,570	2.20
1981	June 10	11,897	489	2,934	4.10
	June 16	17,985	541	3,246	5.50
Subtotal ^a		29,882	589	6,180	4.80
	June 22	3,830	511	3,066	1.25
	June 25	2,000	508	3,048	0.66
	June 30	2,563	484	2,904	0.88
	July 02	1,707	459	2,754	0.62
	July 06	1,088	461	2,766	0.39
	July 09	491	440	2,640	0.37
Total		42,011	613	23,358	1.80
1982	June 14	4,912	464	2,784	1.80
	June 17	11,285	496	2,892	3.80
	June 21	13,343	499	2,994	4.50
	June 24	8,548	459	1,836	4.70
Subtotal ^b		38,088	610	10,506	3.60

- Continued -

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1982	June 28	1,943	352	1,408	1.38
	June 30	2,064	483	1,932	1.07
	July 02	1,095	434	1,736	0.63
	July 05	875	372	2,232	0.39
	July 08	748	435	2,610	0.29
	July 12	307	354	2,124	0.14
Total		45,120	610	22,548	2.00
1983	June 13	7,445	489	2,934	2.54
	June 16	5,961	450	2,700	2.21
Subtotal ^b		13,406	544	5,634	2.38
	June 20	4,776	474	2,844	1.68
	June 23	3,287	450	2,700	1.22
	June 27	2,566	446	2,676	0.96
	June 30	2,359	547	3,282	0.72
	July 04	1,213	443	2,658	0.46
	July 07	1,202	496	2,976	0.40
	July 11	633	466	2,796	0.23
Total		16,036	619	25,566	0.63
1984	June 18	10,845	484	2,904	3.73
	June 21	6,336	443	2,658	2.38
Subtotal		17,181	520	5,562	3.08
	June 25	3,018	466	2,796	1.08
	June 28	2,625	470	2,820	0.93
	July 02	1,988	483	2,898	0.69
	July 05	1,218	426	2,556	0.48
	July 09	1,211	496	2,976	0.41
	July 12	858	436	2,616	0.33
	July 16	744	373	2,238	0.33
Total		28,843	587	24,462	1.18

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHermen</u>	<u>FISHermen HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	6,519	423	2,538	2.07
	June 24	10,413	488	2,928	3.56
	June 27	8,791	492	2,952	2.98
	July 01	6,168	514	3,084	2.00
	July 04	3,774	460	2,760	1.37
Total		35,665	598	14,262	11.98
1986	June 26	7,786	514	3,084	2.52
	June 30	4,200	576	3,456	1.22
	July 03	3,224	556	3,336	0.97
	July 07	1,805	586	3,516	0.51
	July 10	1,156	532	3,192	0.36
Total		18,171	631	16,584	5.58
1987	June 18	18,336	526	4,208	4.36
	June 24				
	June 30				
	July 03	5,970	580	3,480	1.72
	July 07	3,636	578	3,468	1.05
	July 11	1,910	597	3,582	0.53
	July 15	1,415	569	3,414	0.41
	July 20	1,227	551	3,306	0.37
	Aug. 06	207	590	3,540	0.06
	Aug. 13	103	604	3,624	0.03
	Aug. 17	76	595	3,570	0.02
Total		4,862	677	17,466	0.28
1988	June 16	12,640	602	4,816	2.62
	June 20	11,708	612	3,672	3.18
	June 24	9,710	644	3,864	2.51
	June 28	5,350	609	3,654	1.46
	July 02	3,531	580	3,480	1.01
	July 05	2,340	579	3,474	0.67
	July 08	1,891	604	3,624	0.52
	July 11	1,628	598	3,588	0.45
	July 14	1,751	597	3,582	0.49
	July 18	1,107	575	3,450	0.32
	July 21	621	539	3,234	0.19
	July 25	329	494	2,964	0.11
	July 28	333	552	3,312	0.10
	Aug 01	201	594	3,564	0.06

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Appendix B.2. (page 6 of 6)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	Aug 04	206	639	3,834	0.05
	Aug 08	114	640	3,840	0.03
	Aug 10	73	596	3,576	0.02
	Aug 12	115	624	3,744	0.03
	Aug 15	76	613	3,678	0.02
	Aug 18	37	620	3,720	0.01
	Aug 20	29	577	3,462	0.01
	Aug 27	14	532	3,192	0.00
	Aug 31	56	412	2,472	0.02
Total		53,860	746	81,796	0.66

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1989	June 19	9,204	374	2,988	3.08
	June 23	6,011	277	2,218	2.71
	June 26	1,862	126	1,006	1.85
	June 30	9,232	642	5,129	1.80
	July 03	4,600	629	3,770	1.22
	July 05	3,311	553	3,311	1.00
	July 08	3,136	621	3,733	0.84
	July 11	1,691	616	3,676	0.46
	July 14	1,216	590	3,576	0.34
	July 18	868	437	2,630	0.33
	July 27	210	562	3,364	0.06
	Aug 03	174	679	5,432	0.03
	Aug 07	78	642	3,853	0.02
	Aug 09	40	644	3,864	0.01
	Aug 12	34	650	3,900	0.01
	Aug 15	25	616	3,697	0.01
	Aug 18	7	381	2,284	0.00
	Aug 23	19	528	3,167	0.01
	Aug 26	17	508	4,063	0.00
	Aug 29	7	423	3,388	0.00
	Sept 01	3	194	1,421	0.00
Total		41,745	745	70,470	0.66

a The catch totals exclude small numbers of chinook salmon taken in late July and August.

b Unrestricted mesh size.

Appendix B.3. Comparative sockeye salmon catches by fishing period by year in District 1, Lower Kuskokwim River, 1981 - 1989^a.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1981	June 10	48	489	2,934	0.02
	June 16	316	541	3,246	0.10
	June 22	3,852	511	3,066	1.26
	June 25	6,037	508	3,048	1.98
	June 30	12,262	484	2,904	4.22
	July 02	9,769	459	2,754	3.55
	July 06	5,510	461	2,766	1.99
	July 09	7,760	440	2,640	2.94
Total		45,554	613	23,358	1.95
1982	June 14	321	464	2,784	0.12
	June 17	1,061	496	2,892	0.37
	June 21	2,432	499	2,994	0.81
	June 24	3,157	459	1,836	1.72
	June 28	9,938	352	1,408	7.06
	June 30	5,824	483	1,932	3.01
	July 02	3,110	434	1,736	1.79
	July 05	2,769	372	2,232	1.24
	July 08	1,786	435	2,610	0.68
	July 12	638	354	2,124	0.30
Total		31,036	610	22,548	1.38
1983	June 13	114	489	2,934	0.04
	June 16	156	450	2,700	0.06
	June 20	3,289	474	2,844	1.16
	June 23	4,807	450	2,700	1.78
	June 27	10,465	446	2,676	3.91
	June 30	12,490	547	3,282	3.81
	July 04	24,540	443	2,658	9.23
	July 07	7,286	496	2,976	2.45
	July 11	3,001	466	2,796	1.07
Total		66,148	619	25,566	2.59

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1984	June 18	409	484	2,904	0.14
	June 21	2,618	443	2,658	0.98
	June 25	10,743	466	2,796	3.84
	June 28	10,942	470	2,820	3.88
	July 02	8,145	483	2,898	2.81
	July 05	6,798	426	2,556	2.66
	July 09	2,821	496	2,976	0.95
	July 12	2,188	436	2,616	0.84
	July 16	1,121	373	2,238	0.50
Total		45,785	587	24,462	1.87
1985 ^b	June 20	5,246	423	2,538	2.07
	June 24	25,536	488	2,928	8.72
	June 27	26,155	492	2,952	8.86
	July 01	31,082	514	3,084	10.08
	July 04	16,114	460	2,760	5.84
Total		104,133	598	14,262	7.30
1986 ^b	June 26	40,468	514	3,084	13.12
	June 30	22,633	576	3,456	6.55
	July 03	15,766	556	3,336	4.73
	July 07	8,347	586	3,516	2.37
	July 10	5,488	532	3,192	1.72
Total		92,702	631	16,584	5.59
1987	June 18	9,102	526	4,208	2.16
	June 24	24,355	607	4,856	5.02
	June 30	39,112	564	4,512	8.67
	July 03	44,030	580	3,480	12.65
	July 07	9,196	578	3,468	2.65
	July 11	4,611	597	3,582	1.29
	July 15	2,301	569	3,414	0.67
	July 20	774	551	3,306	0.23
Total		99,250	677	32,496	3.05

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 16	7,408	602	4,816	1.53
	June 20	14,502	612	3,672	3.95
	June 24	19,894	644	3,864	5.15
	June 28	17,628	609	3,654	4.82
	July 02	15,102	580	3,480	4.34
	July 05	7,284	579	3,474	2.10
	July 08	3,623	604	3,624	1.00
	July 11	2,467	598	3,588	0.69
	July 14	822	597	3,582	0.23
	July 18	396	575	3,450	0.11
	July 21	164	539	3,234	0.05
	July 25	109	494	2,964	0.37
	July 28	70	552	3,312	0.21
	Aug 01	32	594	3,564	0.01
	Aug 04	105	639	3,834	0.27
	Aug 08	92	640	3,840	0.02
	Aug 10	9	596	3,576	0.00
	Aug 12	11	624	3,744	0.00
	Aug 15	14	613	3,678	0.00
	Aug 18	8	620	3,720	0.00
	Aug 20	5	577	3,462	0.00
	Aug 27	8	532	3,192	0.00
	Aug 31	10	410	2,460	0.00
Total		89,763	746	81,784	1.10
1989	June 19	5,495	374	2,988	1.84
	June 23	7,011	277	2,218	3.16
	June 26	3,746	126	1,006	3.72
	June 30	10,214	642	5,129	1.99
	July 03	5,808	629	3,770	1.54
	July 05	2,917	553	3,311	0.88
	July 08	3,177	621	3,733	0.85
	July 11	1,565	616	3,676	0.42
	July 14	796	590	3,576	0.22
	July 18	451	437	2,630	0.17
Total		41,388	745	70,470	0.59

a The catch totals exclude small numbers of chinook salmon taken in late July and August.

b Unrestricted mesh size.

c Preliminary harvest figures.

Appendix B.4. Comparative chum salmon catches by fishing period by year in District 1, Lower Kuskokwim River, 1971 - 1989^a.

YEAR	DATE	CATCH	NUMBER OF FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1971	June 28-29	11,386	150	180	6.30
	July 01-02	8,949	111	1,332	6.70
	July 05-06	17,672	104	1,248	14.20
	July 08-09	12,603	93	1,116	11.30
	July 12-13	2,550	18	216	11.80
	July 15-16	8,000	69	828	9.70
	July 19-20	5,989	71	852	7.00
Totals		67,149	216	7,392	9.10
1972	June 29-30	9,863	87	1,044	9.40
	July 03-04	19,084	115	1,380	13.80
	July 06-07	19,839	101	1,212	16.40
	July 10-11	13,972	113	1,356	10.30
	July 13-14	6,290	80	960	6.60
Totals		69,048	176	5,952	11.60
1973	June 25-26	19,073	202	2,424	7.90
	June 28-29	47,258	250	6,000	7.90
	July 02-03	21,410	242	2,904	7.40
	July 05-06	31,056	212	2,544	12.20
	July 09-10	24,593	217	2,604	9.40
Totals		143,390	341	16,476	8.70
1974	June 27	27,017	267	1,602	16.90
	July 01-02	55,356	380	4,560	12.10
	July 04-05	27,211	282	3,384	8.00
	July 08-09	50,672	376	4,512	11.20
	July 18	6,661	190	1,140	5.84
Totals		166,917	467	15,198	11.00
1975	June 30	31,216	279	1,674	18.60
	July 03	35,525	360	2,160	16.00
	July 07	39,369	396	2,214	17.80

-Continued-

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1975	July 10	39,910	304	1,824	21.90
	July 14	21,092	326	1,956	10.80
	Totals	167,112	539	9,828	17.00
1976	June 28	42,464	348	2,088	20.30
	July 01	44,024	415	2,490	17.70
	July 08	48,669	381	2,286	21.30
	July 12	21,153	377	2,262	9.40
	July 15	14,176	265	1,590	8.90
	Totals	170,486	517	10,716	15.90
1977	June 27	40,321	378	2,268	17.80
	June 30	58,884	409	2,454	24.00
	July 04	37,500	331	1,986	18.90
	July 07	56,943	368	2,208	25.80
	July 14	24,765	385	2,310	10.70
	Totals	218,413	522	11,226	19.50
1978	June 26	44,296	449	2,694	16.40
	June 29	36,793	442	2,652	13.90
	July 03	26,629	476	2,856	9.30
	July 06	48,031	485	5,820	8.30
	July 10	48,931	428	5,136	9.50
	July 13	14,935	422	2,532	5.90
	Totals	219,615	617	21,690	10.10
1979	June 22	32,295	502	3,012	10.70
	June 26	53,648	531	3,186	16.80
	June 29	48,643	542	3,252	14.90
	July 03	83,164	542	3,252	25.60
	July 10	32,434	520	3,120	10.40
	Totals	250,184	617	15,822	15.80

-Continued-

Appendix B.4. (page 3 of 5)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1980	June 23	105,825	436	2,616	40.50
	June 26	131,945	408	2,448	53.90
	July 02	122,613	383	2,298	53.40
	July 09	90,233	431	2,586	34.90
Totals		450,616	579	9,948	45.20
1981	June 22	78,168	511	3,066	25.50
	June 25	81,431	508	3,048	26.70
	June 30	51,942	484	2,904	17.90
	July 02	58,594	459	2,754	21.30
	July 06	55,799	461	2,766	20.20
	July 09	66,138	440	2,640	25.00
Totals		392,072	613	17,178	22.80
1982	June 28	58,528	352	1,408	41.60
	June 30	47,773	483	1,932	24.70
	July 02	38,918	434	1,736	22.40
	July 05	29,315	372	2,232	13.10
	July 08	28,942	435	2,610	11.90
	July 12	20,709	354	2,124	9.80
Totals		224,185	576	12,042	18.60
1983	June 20	28,915	474	2,844	10.20
	June 23	24,625	450	2,700	9.10
	June 27	44,802	446	2,676	16.70
	June 30	55,209	547	3,282	16.80
	July 04	46,176	443	2,658	17.40
	July 07	36,965	496	2,976	12.40
	July 11	20,560	466	2,769	7.40
Totals		257,252	619	19,905	12.90
1984	June 25	91,773	466	2,796	32.80
	June 28	67,120	470	2,820	23.80
	July 02	69,897	483	2,898	24.10

-Continued-

Appendix B.4. (page 4 of 5)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1984	July 05	54,981	426	2,556	21.50
	July 09	36,440	496	2,976	12.10
	July 12	24,269	436	2,616	9.30
	July 16	18,613	373	2,238	8.30
Totals		363,093	587	18,900	19.20
1985	June 20	19,762	423	2,538	7.79
	June 24	42,778	488	2,928	14.61
	June 27	47,443	492	2,952	16.07
	July 01	47,471	514	3,084	15.39
	July 04	28,581	460	2,760	10.36
Total		186,035	598	14,262	13.04
1986	June 26	68,947	514	3,084	22.36
	June 30	60,780	576	3,456	17.59
	July 03	65,839	556	3,336	19.74
	July 07	55,983	586	3,516	15.92
	July 10	48,990	532	3,192	15.35
Total		300,539	631	16,584	18.12
1987	June 18	13,472	526	4,208	3.20
	June 24	54,454	607	4,856	11.21
	June 30	112,963	564	4,512	25.04
	July 03	66,783	580	3,480	19.19
	July 07	103,059	578	3,468	29.72
	July 11	72,118	597	3,582	20.13
	July 15	71,923	569	3,414	21.07
	July 20	62,044	551	3,306	18.77
	Aug. 06	4,074	590	3,540	1.15
	Aug. 13	894	604	3,624	0.25
Total		561,784	677	37,990	14.79
1988	June 16	72,219	602	4,816	15.00
	June 20	113,628	612	3,672	30.94
	June 24	119,808	644	3,864	31.00
	June 28	154,027	609	3,654	42.15
	July 02	187,916	580	3,480	54.00
	July 05	163,971	579	3,474	47.20
	July 08	138,772	604	3,624	38.20

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YEAR	DATE	CATCH	NUMBER OF FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1988	July 11	137,450	598	3,588	38.31
	July 14	116,930	597	3,582	32.64
	July 18	57,749	575	3,450	16.73
	July 21	39,643	539	3,234	12.25
	July 25	24,893	494	2,964	8.40
	July 28	16,028	552	3,312	4.50
	Aug 01	6,967	594	3,564	1.95
	Aug 04	5,152	639	3,834	1.34
	Aug 08	2,890	640	3,840	0.75
	Aug 10	1,376	596	3,576	0.38
	Aug 12	1,422	624	3,744	0.38
	Aug 15	663	613	3,678	0.18
	Aug 18	330	620	3,720	0.09
	Aug 20	121	577	3,462	0.03
	Aug 27	93	532	3,192	0.03
	Aug 31	2,585	412	2,472	1.05
Total		1,364,533	746	81,796	16.68
1989	June 19	41,789	374	2,988	13.97
	June 23	65,650	277	2,218	29.63
	June 26	32,373	126	1,006	32.12
	June 30	131,629	642	5,129	26.63
	July 03	91,345	629	3,770	24.20
	July 05	85,727	553	3,311	25.84
	July 08	119,066	621	3,733	31.96
	July 11	78,053	616	3,676	21.12
	July 14	44,401	590	3,576	12.54
	July 18	26,407	437	2,630	10.07
	July 27	5,716	562	3,364	1.70
	Aug 03	3,615	679	5,432	0.67
	Aug 07	868	642	3,853	0.23
	Aug 09	432	644	3,864	0.11
	Aug 12	122	650	3,900	0.03
	Aug 15	119	616	3,697	0.03
	Aug 18	16	381	2,284	0.01
	Aug 23	21	528	3,167	0.01
	Aug 26	15	508	4,063	0.00
	Aug 29	21	423	3,388	0.01
	Sept 01	7	194	1,421	0.01
Total		727,392	745	70,470	10.32

- a The catch totals exclude small numbers of chinook salmon taken in late July and August.
b Unrestricted mesh size.
c Preliminary harvest figures.

Appendix B.5. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960 - 1989.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	5,969	0	2,498	0	0	8,467
1961	18,918	0	5,044	0	0	23,962
1962	15,341	0	12,432	0	0	27,773
1963	12,016	0	15,660	0	0	27,676
1964	17,149	0	28,613	0	0	45,762
1965	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	21,720	23	81,945	10	181,840	285,538
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	267,698	566,225
1984	31,742	48,575	623,447	2,942	423,718	1,130,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
1988	55,716	92,025	524,296	10,825	1,381,674	2,064,536
1989	43,217	42,747	479,856	464	749,182	1,315,466
Five Year Average (1984-1988)	36,188	95,856	508,561	3,461	577,684	1,221,750

Appendix B.6. Kuskokwim River escapement of chum salmon by age and sex, 1982-1989.

Sex	Sample Size	Total years of life at maturity ^a				Total
		3	4	5	6	
1982: Aniak River ^b						
Male	371	0.0	35.8	29.2	0.7	65.7
Female	194	0.0	24.6	9.7	0.0	34.3
Combined	565	0.0	60.4	38.9	0.7	100.0
Total Esc. ^c		0	234,913	151,557	2,756	389,226
1982: Kogrukluk River ^d						
Male	147	0.0	39.2	17.8	0.0	57.0
Female	111	0.0	31.7	10.9	0.4	43.0
Combined	258	0.0	70.9	28.7	0.4	100.0
Total Esc. ^c		0	36,320	14,686	198	51,204
1982: Salmon River ^d						
Male	18	0.0	62.1	13.8	0.0	75.9
Female	7	0.0	24.1	0.0	0.0	24.1
Combined	25	0.0	86.2	13.8	0.0	100.0
Total Esc. ^e						
1983: Aniak River ^b						
Male	137	0.0	6.1	70.4	0.0	76.5
Female	42	0.0	6.7	16.8	0.0	23.5
Combined	179	0.0	12.8	87.2	0.0	100.0
Total Esc. ^c		0	14,760	100,109	0	114,869
1983: Kogrukluk River ^d						
Male	280	0.0	9.6	47.6	1.0	58.2
Female	201	0.4	12.3	28.5	0.6	41.8
Combined	481	0.4	21.9	76.1	1.6	100.0
Total Esc. ^e		37	1,964	6,846	150	8,997
1984: Aniak River ^b						
Male	69	0.0	50.5	14.6	1.9	67.0
Female	34	0.0	21.3	10.7	1.0	33.0
Combined	103	0.0	71.8	25.3	2.9	100.0
Total Esc. ^c		0	197,760	69,484	8,017	275,261
1984: Kogrukluk River ^b						
Male	840	0.0	50.8	13.7	2.0	66.5
Female	408	0.0	23.8	8.4	1.3	33.5
Combined	1,248	0.0	74.6	22.1	3.3	100.0
Total Esc. ^c		0	30,934	9,170	1,380	41,484

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Sex	Sample Size	Total years of life at maturity ^a .				Total
		3	4	5	6	
1985: Aniak River ^b						
Male	88	0.0	18.5	32.7	1.2	52.4
Female	80	0.0	22.6	25.0	0.0	47.6
Combined	168	0.0	41.1	57.7	1.2	100.0
Total Esc. ^c		0	90,825	127,508	2,652	220,985
1985: Kogrukluk River ^b						
Male	478	0.2	15.9	38.1	0.5	54.7
Female	396	0.0	14.4	30.9	0.0	45.3
Combined	874	0.2	30.3	69.0	0.5	100.0
Total Esc. ^b		30	4,546	10,351	75	15,002
1986: Kogrukluk River ^b						
Male	359	0.2	26.0	9.7	0.8	36.7
Female	209	0.2	43.7	17.8	1.6	63.3
Combined	568	0.4	69.7	27.5	2.4	100.0
Total Esc. ^f						
1986: Kisaralik River ^s						
Male	478	0.0	13.6	27.3	0.0	40.9
Female	396	0.0	13.6	45.5	0.0	59.1
Combined	874	0.0	27.2	72.8	0.0	100.0
Total Esc. ^f						
1987: Kogrukluk River ^b						
Male	88	0.0	12.4	36.0	6.2	44.7
Female	72	0.0	9.9	32.9	1.9	54.7
Combined	160	0.0	22.4	69.6	8.1	100.0
Total Esc. ^f		0	3,920	12,091	1,411	17,422
1987: Holitna River ^h						
Male	139	0.0	8.7	57.9	4.6	71.3
Female	56	0.0	4.6	23.6	0.5	28.7
Combined	195	0.0	13.3	81.5	5.1	100.0
Total Esc. ^f						
1987: Aniak River ^s						
Male						
Female						
Combined						
Total Esc. ^f						

Appendix B.6. (page 3 of 3)

- a Total years of life at maturity represents the total number of freshwater and marine annuli, plus one.
- b Allocation by age and sex based on weir samples.
- c Escapement based on weir counts.
- d Allocation by age and sex based on 4.25 in (11 cm), 5.5 in (14 cm), and 8.5 in (22 cm) stretch mesh gill net samples.
- e Escapement estimate based on adjusted sonar counts.
- f No escapement estimates available.
- g Allocation by age and sex based on 'hook and line' samples.
- h Samples collected from one subsistence net.

1983					
Male	410	0.4	20.7	26.7	1.0
Female	837	0.6	32.2	22.4	0.3
Combined	1,247	1.0	52.9	49.1	1.3
Total Harvest	4,766	218,282	247,332	247,332	416,222
1984					
Male	773	0.3	37.4	4.8	0.7
Female	1,020	0.8	21.3	4.8	0.2
Combined	1,793	0.8	58.7	9.6	0.9
Total Harvest	4,284	202,187	22,010	2,117	273,018
1985					
Male	478	0.2	18.4	28.3	0.3
Female	523	0.4	18.4	34.8	0.1
Combined	1,001	0.7	36.8	63.1	0.4
Total Harvest	3,032	101,382	180,741	1,162	207,328
1986 Commercial Harvest					
Male	101	0.3	32.9	10.4	0.2
Female	262	0.3	41.0	11.7	0.3
Combined	363	0.3	73.9	22.1	0.2
Total Harvest	1,246	237,582	68,336	1,647	208,213
1986 Subsistence Harvest					
Male	0.0	0.0	22.0	7.9	0.0
Female	0.0	0.0	28.8	8.3	0.0
Combined	0.0	0.0	50.8	16.3	0.0
Total Harvest	0	0	70,841	14,327	843
Subsistence Harvest	0	0	70,841	14,327	843

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Appendix B.7. Kuskokwim River commercial and subsistence chum salmon catch by age and sex, 1982-1987.

	Sample	Total years of life at maturity ^a				
Sex	Size	3	4	5	6	Total
1982:						
Male	258	0.7	31.1	18.8	0.6	51.2
Female	166	0.5	35.8	12.1	0.4	48.8
Combined	424	1.2	66.9	30.9	1.0	100.0
Total Harvest ^b		5,620	313,321	144,718	4,683	468,342
1983:						
Male	814	0.4	20.3	26.5	1.0	48.2
Female	833	0.6	25.5	25.4	0.3	51.8
Combined	1,647	1.0	45.8	51.9	1.3	100.0
Total Harvest ^b		4,766	218,262	247,332	6,195	476,555
1984:						
Male	773	0.3	37.4	4.8	0.7	43.2
Female	1,052	0.5	51.3	4.8	0.2	56.8
Combined	1,825	0.8	88.7	9.6	0.9	100.0
Total Harvest ^b		4,584	508,267	55,010	5,157	573,018
1985:						
Male	476	0.3	16.4	29.3	0.3	46.3
Female	553	0.4	18.4	34.8	0.1	53.7
Combined	1,029	0.7	34.8	64.1	0.4	100.0
Total Harvest ^b		2,039	101,382	186,741	1,165	291,328
1986: Commercial Harvest						
Male	502	0.2	35.9	10.4	0.2	46.7
Female	562	0.3	41.0	11.7	0.3	53.3
Combined	1,064	0.5	76.9	22.1	0.5	100.0
Comm. Harvest ^b		1,546	237,785	68,336	1,647	309,213
1986: Subsistence Harvest						
Male		0.0	25.0	7.0	0.0	32.0
Female		0.0	58.8	8.3	0.9	68.0
Combined	228	0.0	83.8	15.3	0.9	100.0
Subsist. Harvest		0	78,471	14,327	843	93,641

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	Sample	Total years of life at maturity ^a				
Sex	Size	3	4	5	6	Total
1987: Commercial Harvest						
Male	559	0.8	21.0	20.3	0.5	42.6
Female	753	0.8	31.3	24.9	0.4	57.4
Combined	1,312	0.0	0.0	0.0	0.0	0.0
Commercial and Subsistence Harvest ^b						
		9,875	335,913	290,797	5,885	642,470
1988: Subsistence Harvest ^c						
Male						0.0
Female						0.0
Combined		0.0	0.0	0.0	0.0	0.0
Subsist. Harvest						
		0	0	0	0	

^a Total years of life at maturity represents the total number of freshwater and marine annuli, plus one.

^b Allocation by age and sex based on commercial harvest samples.

^c Allocation by age class based on subsistence harvest samples, and allocation by sex based on commercial harvest samples.

Appendix B.8. Kuskokwim River chinook salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-89.

Date	CPUE						Percent					
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989
06/01						0.0						0.0
06/02	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0
06/03	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0
06/04	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0
06/05	1.4	0.0	0.0	5.1	4.8	0.0	0.5	0.0	0.0	0.9	1.3	0.0
06/06	1.4	0.0	0.0	8.4	4.8	0.0	0.5	0.0	0.0	1.4	1.3	0.0
06/07	2.6	0.0	0.0	12.9	7.6	1.7	0.9	0.0	0.0	2.2	2.1	0.3
06/08	2.6	0.0	0.0	29.3	29.7	8.2	0.9	0.0	0.0	5.0	8.2	1.6
06/09	2.6	0.0	2.9	38.4	44.1	16.8	0.9	0.0	1.5	6.6	12.2	3.2
06/10	2.6	0.0	4.4	58.8	49.4	32.1	0.9	0.0	2.2	10.1	13.7	6.1
06/11	3.3	0.0	5.8	76.6	70.8	36.4	1.2	0.0	2.9	13.2	19.6	6.9
06/12	7.1	0.0	10.3	98.4	89.0	45.0	2.6	0.0	5.2	16.9	24.7	8.6
06/13	11.0	0.0	10.3	111.8	100.0	56.4	4.0	0.0	5.2	19.2	27.7	10.8
06/14	14.6	0.0	11.6	132.8	103.0	83.5	5.4	0.0	5.8	22.8	28.5	15.9
06/15	18.3	0.0	11.6	142.9	111.0	102.2	6.7	0.0	5.8	24.6	30.8	19.5
06/16	25.3	0.0	11.6	154.1	119.2	109.4	9.3	0.0	5.8	26.5	33.0	20.9
06/17	35.4	0.0	11.6	207.8	139.8	130.3	13.0	0.0	5.8	35.7	38.7	24.9
06/18	43.5	0.0	11.6	221.9	147.0	165.4	15.9	0.0	5.8	38.1	40.7	31.6
06/19	55.3	0.0	13.1	234.9	160.4	184.5	20.3	0.0	6.5	40.4	44.4	35.3
06/20	64.7	0.0	21.9	253.3	185.2	200.8	23.7	0.0	10.9	43.5	51.3	38.4
06/21	76.4	1.4	41.8	276.6	201.1	214.6	28.0	1.3	20.9	47.5	55.7	41.0
06/22	83.8	8.0	55.5	306.3	214.3	231.5	30.7	7.0	27.7	52.6	59.4	44.2
06/23	111.5	8.0	59.5	332.7	230.6	254.9	40.8	7.0	29.7	57.2	63.9	48.7
06/24	125.6	10.6	74.0	341.9	251.8	276.0	46.0	9.3	37.0	58.7	69.8	52.7
06/25	132.4	10.6	76.8	379.4	259.6	302.3	48.5	9.3	38.3	65.2	71.9	57.8
06/26	146.7	15.1	94.1	399.8	269.8	350.1	53.7	13.2	47.0	68.7	74.7	66.9
06/27	150.4	15.1	108.9	425.2	283.9	400.5	55.1	13.2	54.4	73.1	78.7	76.5
06/28	157.9	17.6	123.1	439.8	288.8	411.8	57.8	15.5	61.5	75.6	80.0	78.7
06/29	164.1	25.9	136.5	458.3	292.1	414.6	60.1	22.7	68.2	78.7	80.9	79.2
06/30	171.3	34.5	137.6	470.5	295.0	436.8	62.7	30.3	68.7	80.9	81.7	83.4
07/01	173.6	38.3	143.0	485.9	306.9	448.1	63.5	33.6	71.4	83.5	85.0	85.6
07/02	180.4	50.5	147.8	495.4	308.1	451.5	66.0	44.3	73.8	85.1	85.4	86.3
07/03	191.0	51.8	147.8	498.4	312.9	461.0	69.9	45.4	73.8	85.6	86.7	88.1
07/04	193.6	60.5	150.7	506.5	318.2	467.7	70.9	53.0	75.2	87.0	88.2	89.4
07/05	199.6	66.9	153.5	513.0	325.8	477.5	73.1	58.6	76.6	88.2	90.3	91.2
07/06	207.7	76.3	160.6	522.1	325.8	479.2	76.0	66.9	80.2	89.7	90.3	91.5
07/07	216.6	84.7	166.1	536.7	325.8	487.9	79.3	74.2	82.9	92.2	90.3	93.2
07/08	221.8	87.5	172.7	536.7	325.8	491.6	81.2	76.6	86.2	92.2	90.3	93.9
07/09	230.9	92.8	175.8	538.0	325.8	496.1	84.5	81.3	87.8	92.4	90.3	94.8
07/10	233.4	97.9	178.7	541.1	325.8	500.4	85.5	85.8	89.2	93.0	90.3	95.6
07/11	238.0	99.3	180.1	543.3	325.8	500.4	87.1	87.0	89.9	93.3	90.3	95.6
07/12	240.5	101.7	181.6	545.4	325.8	501.4	88.0	89.1	90.7	93.7	90.3	95.8
07/13	242.9	103.2	185.9	547.8	325.8	501.4	88.9	90.4	92.8	94.1	90.3	95.8
07/14	250.1	104.6	188.6	548.9	333.7	501.4	91.6	91.7	94.2	94.3	92.4	95.8
07/15	250.1	104.6	188.6	548.9	333.7	501.4	91.6	91.7	94.2	94.3	92.4	95.8
07/16	250.9	106.5	190.4	548.9	341.4	501.4	91.9	93.3	95.1	94.3	94.6	95.8
07/17	251.8	106.5	190.4	551.5	347.0	502.6	92.2	93.3	95.1	94.8	96.1	96.0
07/18	251.8	107.4	190.4	551.5	348.8	504.4	92.2	94.1	95.1	94.8	96.6	96.4
07/19	251.8	107.4	192.4	565.9	348.8	505.3	92.2	94.1	96.1	97.2	96.6	96.5
07/20	256.1	107.4	192.4	566.8	348.8	510.5	93.8	94.1	96.1	97.4	96.6	97.5
07/21	260.8	107.4	192.4	568.9	348.8	511.4	95.5	94.1	96.1	97.8	96.6	97.7
07/22	262.6	107.4	192.4	568.9	348.8	517.6	96.1	94.1	96.1	97.8	96.6	98.9
07/23	262.6	107.4	192.4	572.3	348.8	517.6	96.1	94.1	96.1	98.3	96.6	98.9
07/24	264.3	107.4	192.4	572.3	349.9	517.6	96.8	94.1	96.1	98.3	96.9	98.9
07/25	266.0	107.4	192.4	572.3	349.9	517.6	97.4	94.1	96.1	98.3	96.9	98.9
07/26	266.0	107.4	194.4	572.3	352.0	517.6	97.4	94.1	97.0	98.3	97.5	98.9
07/27	266.0	107.4	196.3	576.5	354.0	517.6	97.4	94.1	98.0	99.1	98.1	98.9
07/28	266.0	109.4	196.3	576.5	354.0	517.6	97.4	95.9	98.0	99.1	98.1	98.9
07/29	266.8	109.4	200.3	576.5	354.0	517.6	97.7	95.9	100.0	99.1	98.1	98.9

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Appendix B.8. (2 of 2)

Date	CPUE						Percent					
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989
07/30	266.8	111.2	200.3	576.5	358.2	517.6	97.7	97.5	100.0	99.1	99.2	98.9
07/31	268.4	111.2	200.3	576.5	358.2	517.6	98.3	97.5	100.0	99.1	99.2	98.9
08/01	268.4	111.2	200.3	576.5	358.2	517.6	98.3	97.5	100.0	99.1	99.2	98.9
08/02	268.4	111.2	200.3	576.5	358.2	518.7	98.3	97.5	100.0	99.1	99.2	99.1
08/03	268.4	111.2	200.3	577.7	358.2	518.7	98.3	97.5	100.0	99.3	99.2	99.1
08/04	268.4	111.2	200.3	577.7	358.2	518.7	98.3	97.5	100.0	99.3	99.2	99.1
08/05	271.5	111.2	200.3	577.7	358.2	518.7	99.4	97.5	100.0	99.3	99.2	99.1
08/06	273.1	111.2	200.3	577.7	358.2	518.7	100.0	97.5	100.0	99.3	99.2	99.1
08/07	273.1	111.2	200.3	579.8	358.2	518.7	100.0	97.5	100.0	99.6	99.2	99.1
08/08	273.1	111.2	200.3	579.8	358.2	518.7	100.0	97.5	100.0	99.6	99.2	99.1
08/09	273.1	113.1	200.3	579.8	358.2	519.6	100.0	99.1	100.0	99.6	99.2	99.3
08/10	273.1	113.1	200.3	579.8	358.2	519.6	100.0	99.1	100.0	99.6	99.2	99.3
08/11	273.1	113.1	200.3	582.0	360.9	519.6	100.0	99.1	100.0	100.0	100.0	99.3
08/12	273.1	113.1	200.3	582.0	360.9	519.6	100.0	99.1	100.0	100.0	100.0	99.3
08/13	273.1	113.1	200.3	582.0	360.9	521.7	100.0	99.1	100.0	100.0	100.0	99.7
08/14	273.1	113.1	200.3	582.0	360.9	521.7	100.0	99.1	100.0	100.0	100.0	99.7
08/15	273.1	113.1	200.3	582.0	360.9	521.7	100.0	99.1	100.0	100.0	100.0	99.7
08/16	273.1	113.1	200.3	582.0	360.9	521.7	100.0	99.1	100.0	100.0	100.0	99.7
08/17	273.1	113.1	200.3	582.0	360.9	521.7	100.0	99.1	100.0	100.0	100.0	99.7
08/18	273.1	113.1	200.3	582.0	360.9	521.7	100.0	99.1	100.0	100.0	100.0	99.7
08/19	273.1	113.1	200.3	582.0	360.9	521.7	100.0	99.1	100.0	100.0	100.0	99.7
08/20	273.1	113.1	200.3	582.0	360.9	523.5	100.0	99.1	100.0	100.0	100.0	100.0
08/21	273.1 ^a	114.1 ^b	200.3 ^c	582.0 ^d	360.9	523.5	100.0	100.0	100.0	100.0	100.0	100.0

t = 6/22 t = 6/28 t = 6/22

^a Estimated passage based on 1984 calibration (344.44 fish index) is 200,458.

^b Estimated passage based on 1985 calibration (573.59 fish index) is 333,819.

^c Estimated passage based on 1986 calibration (356.94 fish index) is 207,733.

^d Estimated passage based on 1987 calibration (405.10 fish index) is 235,761.

Appendix B.9. Kuskokwim River sockeye salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-89.

Date	CPUE						Percent					
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989
06/04	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
06/05	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
06/06	0.0	0.0	0.0	9.1	0.0	2.9	0.0	0.0	0.0	0.3	0.0	0.4
06/07	0.0	0.0	0.0	18.2	0.0	2.9	0.0	0.0	0.0	0.7	0.0	0.4
06/08	0.0	0.0	0.0	35.2	12.3	2.9	0.0	0.0	0.0	1.3	0.8	0.4
06/09	0.0	0.0	0.0	47.8	26.6	5.8	0.0	0.0	0.0	1.7	1.8	0.7
06/10	0.0	0.0	0.0	63.5	38.3	8.7	0.0	0.0	0.0	2.3	2.6	1.1
06/11	2.7	0.0	0.0	79.6	81.6	28.5	0.5	0.0	0.0	2.9	5.4	3.6
06/12	2.7	0.0	6.0	191.4	143.2	40.0	0.5	0.0	0.2	6.9	9.5	5.0
06/13	2.7	0.0	14.1	240.0	190.7	51.1	0.5	0.0	0.6	8.7	12.7	6.4
06/14	2.7	0.0	26.9	248.7	204.5	78.0	0.5	0.0	1.1	9.0	13.6	9.8
06/15	7.7	0.0	29.8	290.4	213.6	101.8	1.3	0.0	1.2	10.5	14.2	12.7
06/16	7.7	0.0	64.5	458.2	220.9	118.0	1.3	0.0	2.5	16.6	14.7	14.8
06/17	9.8	0.0	70.3	710.2	247.2	128.7	1.7	0.0	2.8	25.7	16.5	16.1
06/18	16.3	0.0	81.8	779.2	295.6	174.6	2.8	0.0	3.2	28.2	19.7	21.8
06/19	16.3	0.0	87.6	795.7	393.6	208.7	2.8	0.0	3.4	28.8	26.2	26.1
06/20	23.1	0.0	135.3	842.8	419.4	227.5	4.0	0.0	5.3	30.5	28.0	28.4
06/21	29.8	0.0	240.3	918.8	554.1	280.1	5.1	0.0	9.4	33.3	36.9	35.0
06/22	51.9	0.0	292.6	1084.7	689.5	338.1	9.0	0.0	11.5	39.3	46.0	42.3
06/23	51.9	2.7	374.9	1439.6	806.6	374.2	9.0	0.2	14.7	52.1	53.8	46.8
06/24	66.0	16.0	494.3	1581.9	869.4	414.1	11.4	1.0	19.4	57.3	57.9	51.8
06/25	86.4	16.0	528.5	1630.5	898.2	496.7	14.9	1.0	20.7	59.1	59.9	62.1
06/26	96.9	28.3	675.9	1692.7	1012.9	522.5	16.7	1.7	26.5	61.3	67.5	65.3
06/27	108.7	39.5	853.3	1726.7	1081.6	575.6	18.8	2.4	33.4	62.5	72.1	72.0
06/28	144.3	137.0	915.8	1768.2	1123.8	615.8	24.9	8.3	35.9	64.0	74.9	77.0
06/29	182.9	137.0	949.2	1805.4	1132.9	650.3	31.6	8.3	37.2	65.4	75.5	81.3
06/30	201.4	272.3	1180.7	1969.2	1177.7	690.3	34.8	16.5	46.3	71.3	78.5	86.3
07/01	241.5	399.9	1384.8	2210.5	1268.8	703.7	41.7	24.2	54.3	80.1	84.6	88.0
07/02	258.8	526.2	1592.8	2273.3	1296.6	715.2	44.7	31.8	62.4	82.3	86.4	89.4
07/03	271.0	643.3	1745.3	2308.9	1329.0	737.6	46.8	38.9	68.4	83.6	88.6	92.2
07/04	293.6	899.4	1768.4	2433.1	1383.2	739.1	50.7	54.4	69.3	88.1	92.2	92.4
07/05	334.4	1049.1	2000.0	2599.0	1428.1	744.5	57.7	63.4	78.4	94.1	95.2	93.1
07/06	359.4	1239.0	2017.8	2611.1	1444.7	747.2	62.0	74.9	79.1	94.6	96.3	93.4
07/07	395.1	1292.7	2115.4	2655.4	1456.2	760.7	68.2	78.1	82.9	96.2	97.0	95.1
07/08	437.1	1360.7	2200.5	2661.9	1468.8	776.0	75.5	82.3	86.2	96.4	97.9	97.0
07/09	451.0	1393.6	2232.5	2691.5	1478.4	779.0	77.9	84.2	87.5	97.5	98.5	97.4
07/10	498.1	1438.9	2279.7	2721.8	1483.4	779.0	86.0	87.0	89.3	98.6	98.9	97.4
07/11	525.0	1495.4	2313.2	2726.0	1487.8	781.1	90.6	90.4	90.6	98.7	99.2	97.7
07/12	542.4	1553.0	2386.7	2729.3	1487.8	785.8	93.6	93.9	93.5	98.9	99.2	98.2
07/13*	544.8	1556.1	2407.9	2736.2	1487.8	789.9	94.0	94.1	94.3	99.1	99.2	98.8
07/14	546.5	1578.6	2428.2	2740.7	1487.8	789.9	94.3	95.4	95.1	99.3	99.2	98.8
07/15	548.9	1584.4	2429.2	2743.7	1490.8	789.9	94.8	95.8	95.2	99.4	99.4	98.8
07/16	548.9	1596.8	2437.4	2743.7	1492.4	797.4	94.8	96.5	95.5	99.4	99.5	99.7
07/17	549.8	1602.6	2460.6	2745.8	1492.4	798.5	94.9	96.9	96.4	99.4	99.5	99.8
07/18	552.7	1607.3	2480.2	2745.8	1495.7	798.5	95.4	97.2	97.2	99.4	99.7	99.8
07/19	562.4	1609.3	2495.9	2751.9	1497.5	799.8	97.1	97.3	97.8	99.7	99.8	100.0
07/20	564.0	1609.3	2497.9	2755.1	1497.5	799.8	97.4	97.3	97.9	99.8	99.8	100.0
07/21	569.2	1618.6	2505.5	2755.1	1497.5	799.8	98.3	97.8	98.2	99.8	99.8	100.0
07/22	573.2	1622.1	2512.9	2755.1	1497.5	799.8	98.9	98.1	98.5	99.8	99.8	100.0
07/23	573.2	1625.8	2518.5	2755.1	1498.6	799.8	98.9	98.3	98.7	99.8	99.9	100.0
07/24	575.1	1629.2	2522.4	2755.1	1498.6	799.8	99.3	98.5	98.8	99.8	99.9	100.0
07/25	576.0	1634.6	2526.1	2755.1	1499.7	799.8	99.4	98.8	99.0	99.8	99.9	100.0
07/26	576.0	1639.4	2534.1	2755.1	1499.7	799.8	99.4	99.1	99.3	99.8	99.9	100.0
07/27	576.0	1647.8	2538.1	2755.1	1499.7	799.8	99.4	99.6	99.4	99.8	99.9	100.0
07/28	577.7	1650.8	2540.0	2755.1	1499.7	799.8	99.7	99.8	99.5	99.8	99.9	100.0
07/29	579.3	1650.8	2540.0	2755.1	1499.7	799.8	100.0	99.8	99.5	99.8	99.9	100.0
07/30	579.3	1650.8	2540.0	2755.1	1499.7	799.8	100.0	99.8	99.5	99.8	99.9	100.0
07/31	579.3	1652.5	2540.0	2755.1	1499.7	799.8	100.0	99.9	99.5	99.8	99.9	100.0

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Appendix B.9. (2 of 2)

Date	CPUE						Percent					
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989
08/01	579.3	1652.5	2542.2	2755.1	1500.5	799.8	100.0	99.9	99.6	99.8	100.0	100.0
08/02	579.3	1652.5	2542.2	2757.2	1500.5	799.8	100.0	99.9	99.6	99.9	100.0	100.0
08/03	579.3	1652.5	2544.3	2759.0	1500.5	799.8	100.0	99.9	99.7	99.9	100.0	100.0
08/04	579.3	1652.5	2546.4	2759.0	1500.5	799.8	100.0	99.9	99.8	99.9	100.0	100.0
08/05	579.3	1652.5	2546.4	2759.0	1500.5	799.8	100.0	99.9	99.8	99.9	100.0	100.0
08/06	579.3	1652.5	2547.6	2759.0	1500.5	799.8	100.0	99.9	99.8	99.9	100.0	100.0
08/07	579.3	1652.5	2547.6	2759.0	1500.5	799.8	100.0	99.9	99.8	99.9	100.0	100.0
08/08	579.3	1654.2	2547.6	2759.0	1500.5	799.8	100.0	100.0	99.8	99.9	100.0	100.0
08/09	579.3	1654.2	2547.6	2759.0	1500.5	799.8	100.0	100.0	99.8	99.9	100.0	100.0
08/10	579.3	1654.2	2547.6	2759.0	1500.5	799.8	100.0	100.0	99.8	99.9	100.0	100.0
08/11	579.3	1654.2	2548.7	2759.0	1500.5	799.8	100.0	100.0	99.9	99.9	100.0	100.0
08/12	579.3	1654.2	2548.7	2761.0	1500.5	799.8	100.0	100.0	99.9	100.0	100.0	100.0
08/13	579.3	1654.2	2548.7	2761.0	1500.5	799.8	100.0	100.0	99.9	100.0	100.0	100.0
08/14	579.3	1654.2	2548.7	2761.0	1500.5	799.8	100.0	100.0	99.9	100.0	100.0	100.0
08/15	579.3	1654.2	2551.4	2761.0	1500.5	799.8	100.0	100.0	100.0	100.0	100.0	100.0
08/16	579.3	1654.2	2551.4	2761.0	1500.5	799.8	100.0	100.0	100.0	100.0	100.0	100.0
08/17	579.3	1654.2	2551.4	2761.0	1500.5	799.8	100.0	100.0	100.0	100.0	100.0	100.0
08/18	579.3	1654.2	2551.4	2761.0	1500.5	799.8	100.0	100.0	100.0	100.0	100.0	100.0
08/19	579.3	1654.2	2551.4	2761.0	1500.5	799.8	100.0	100.0	100.0	100.0	100.0	100.0
08/20	579.3	1654.2	2551.4	2761.0	1500.5	799.8	100.0	100.0	100.0	100.0	100.0	100.0
08/21	579.3	1654.2 ^a	2552.3 ^b	2761.0 ^c	1500.5	799.8	100.0	100.0	100.0	100.0	100.0	100.0

^a Estimated passage based on 1985 calibration (213.18 fish/index) is 588,596.

^b Estimated passage based on 1986 calibration (170.28 fish/index) is 470,148.

^c Estimated passage based on 1987 calibration (162.25 fish/index) is 447,977.

Appendix B.10. Kuskokwim River coho salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-89.

Date	CPUE						Percent					
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989
07/12	1.2	0.0	0.0	0.0	0.0	0.0	0.04	0.00	0.00	0.00	0.00	0.00
07/13	1.2	0.0	0.0	0.0	1.0	2.0	0.04	0.00	0.00	0.00	0.03	0.08
07/14	1.2	0.0	0.0	0.0	1.0	3.8	0.04	0.00	0.00	0.00	0.03	0.16
07/15	1.2	0.0	1.9	0.0	1.0	5.7	0.04	0.00	0.04	0.00	0.03	0.23
07/16	2.7	0.9	3.9	0.0	1.0	5.7	0.09	0.06	0.09	0.00	0.03	0.23
07/17	4.1	2.5	5.7	0.0	3.9	7.9	0.13	0.16	0.13	0.00	0.12	0.32
07/18	7.5	2.5	9.5	0.0	3.9	10.8	0.25	0.16	0.22	0.00	0.12	0.44
07/19	13.2	4.2	18.3	0.0	3.9	10.8	0.43	0.27	0.42	0.00	0.12	0.44
07/20	22.2	7.9	28.4	0.0	5.7	23.3	0.73	0.50	0.66	0.00	0.18	0.95
07/21	26.4	13.3	40.3	0.0	7.9	33.7	0.86	0.84	0.93	0.00	0.25	1.37
07/22	29.9	28.1	48.2	6.8	11.1	48.2	0.98	1.78	1.12	0.34	0.35	1.97
07/23	36.7	28.1	64.6	8.0	11.1	54.9	1.20	1.78	1.50	0.40	0.35	2.24
07/24	45.3	31.1	115.7	8.0	24.2	60.7	1.48	1.97	2.68	0.40	0.77	2.48
07/25	56.6	48.5	145.0	9.3	37.4	64.7	1.85	3.08	3.36	0.46	1.18	2.64
07/26	72.6	68.9	163.2	12.4	43.7	65.7	2.37	4.37	3.78	0.62	1.38	2.68
07/27	95.4	72.8	215.4	16.7	81.0	69.7	3.12	4.62	4.99	0.83	2.56	2.84
07/28	127.7	89.1	235.0	19.1	152.9	77.6	4.18	5.66	5.44	0.95	4.84	3.16
07/29	186.3	128.4	299.2	30.8	182.4	86.4	6.09	8.15	6.93	1.54	5.77	3.52
07/30	341.3	147.7	351.2	36.5	226.2	122.5	11.16	9.38	8.13	1.82	7.16	5.00
07/31	491.4	167.2	374.2	38.9	279.6	456.0	16.07	10.61	8.66	1.94	8.85	18.60
08/01	685.9	205.1	652.4	52.5	328.9	666.5	22.44	13.02	15.11	2.62	10.41	27.19
08/02	768.7	233.4	746.5	91.2	357.2	1059.0	25.14	14.82	17.28	4.55	11.30	43.20
08/03	1049.9	290.4	1111.8	171.1	444.6	1144.5	34.34	18.43	25.74	8.53	14.07	46.69
08/04	1094.9	348.3	1498.0	227.9	483.8	1163.3	35.81	22.11	34.68	11.37	15.31	47.46
08/05	1183.6	377.8	1721.2	253.0	518.1	1303.5	38.72	23.98	39.85	12.62	16.40	53.18
08/06	1318.0	463.0	1933.2	297.2	858.9	1602.2	43.11	29.39	44.76	14.83	27.18	65.36
08/07	1350.8	605.2	2143.0	392.4	1195.5	1793.0	44.18	38.42	49.62	19.57	37.84	73.15
08/08	1456.2	690.8	2230.2	435.1	1343.4	1829.4	47.63	43.85	51.64	21.70	42.52	74.63
08/09	1534.1	799.0	2372.5	470.3	1385.1	1978.0	50.18	50.72	54.93	23.46	43.84	80.69
08/10	1588.5	895.9	2651.2	505.6	1500.3	2004.2	51.96	56.87	61.38	25.22	47.48	81.76
08/11	1699.4	1096.8	2733.7	537.7	1738.9	2135.9	55.59	69.62	63.29	26.82	55.03	87.13
08/12	1782.5	1189.6	3024.0	710.7	1941.1	2210.0	58.30	75.52	70.02	35.45	61.43	90.16
08/13	1819.0	1256.1	3120.7	822.9	2006.6	2238.2	59.50	79.74	72.26	41.05	63.51	91.31
08/14	1842.8	1286.5	3186.3	1145.0	2176.4	2258.6	60.28	81.67	73.77	57.12	68.88	92.14
08/15	1841.8	1347.6	3351.6	1291.2	2349.8	2262.0	60.24	85.55	77.60	64.41	74.37	92.28
08/16	1957.2	1416.0	3402.4	1405.4	2404.1	2263.4	64.02	89.89	78.78	70.11	76.09	92.33
08/17	2169.2	1433.8	3442.8	1487.9	2521.1	2275.4	70.95	91.02	79.71	74.22	79.79	92.83
08/18	2463.5	1456.9	3551.1	1540.3	2631.7	2280.5	80.58	92.48	82.22	76.83	83.29	93.03
08/19	2645.5	1460.9	3636.6	1556.2	2666.3	2286.6	86.53	92.74	84.20	77.63	84.38	93.28
08/20	2649.8	1473.8	3669.7	1566.6	2702.5	2300.0	86.67	93.56	84.97	78.15	85.53	93.83
08/21	2676.8	1490.9	3761.8	1582.2	2711.3	2342.6	87.56	94.64	87.10	78.92	85.81	95.56
08/22	2794.5	1490.9	3813.2	1590.4	2779.0	2359.2	91.41	94.64	88.29	79.33	87.95	96.24
08/23	2816.8	1499.5	3940.8	1611.3	2849.1	2375.1	92.14	95.19	91.24	80.38	90.17	96.89
08/24	2826.1	1507.5	4020.2	1636.0	2943.2	2379.6	92.44	95.70	93.08	81.61	93.15	97.08
08/25	2860.2	1519.2	4214.2	1647.5	3048.4	2399.4	93.56	96.44	97.57	82.18	96.48	97.88
08/26	2876.8	1519.2	4303.7	1662.7	3097.2	2412.1	94.10	96.44	99.65	82.94	98.02	98.40
08/27	2892.3	1529.2	4319.0	1693.3	3144.7	2427.3	94.61	97.07	100.00	84.47	99.53	99.02
08/28	2908.4	1567.3	4319.0 ^c	1736.9	3153.6	2439.2	95.13	99.49	100.00	86.64	99.81	99.51
08/29	2952.7	1575.3		1762.7	3159.7	2444.1	96.58	100.00		87.93	100.00	99.71
08/30	2971.7	1575.3		1807.4		2445.1	97.20	100.00		90.16		99.75
08/31	2997.2	1575.3		1807.4		2451.3	98.04	100.00		90.16		100.00
09/01	3005.2	1575.3		1827.5			98.30	100.00		91.16		
09/02	3015.7	1575.3		1858.6			98.64	100.00		92.71		
09/03	3019.2	1575.3		1898.8			98.76	100.00		94.72		
09/04	3022.8	1575.3		1911.6			98.87	100.00		95.36		
09/05	3049.9	1575.3		1943.4			99.76	100.00		96.94		
09/06	3057.2 ^a	1575.3 ^b		1956.5			100.00	100.00		97.60		

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Appendix B.10. (2 of 2)

Date	CPUE						Percent					
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989
09/07				1974.0						98.47		
09/08				1982.1						98.87		
09/09				2001.1						99.82		
09/10				2004.7						100.00		
09/11				2004.7 ^a						100.00		
^a Estimated passage based on 1984 calibration (265.27 fish/index) is 531,789. ^b Estimated passage based on 1985 calibration (384.87 fish/index) is 771,553. ^c Estimated passage based on 1986 calibration (222.66 fish/index) is 446,369. ^d Estimated passage based on 1987 calibration (336.34 fish/index) is 674,264.												

Appendix B.11. Kuskokwim River chum salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-89.

Date	CPUE						Percent					
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989
06/01						2.6						0.1
06/02						2.6						0.1
06/03						2.6						0.1
06/04	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.1
06/05	0.0	0.0	0.0	3.3	8.7	5.6	0.0	0.0	0.0	0.1	0.2	0.2
06/06	0.0	0.0	0.0	15.7	8.7	5.6	0.0	0.0	0.0	0.3	0.2	0.2
06/07	0.0	0.0	0.0	21.8	11.7	11.5	0.0	0.0	0.0	0.4	0.2	0.4
06/08	4.7	0.0	0.0	30.3	23.0	27.8	0.2	0.0	0.0	0.6	0.4	1.1
06/09	4.7	0.0	0.0	45.3	60.9	30.3	0.2	0.0	0.0	0.9	1.2	1.2
06/10	4.7	0.0	6.0	51.5	90.3	42.1	0.2	0.0	0.1	1.1	1.7	1.6
06/11	4.7	0.0	15.0	72.4	152.8	44.8	0.2	0.0	0.4	1.5	2.9	1.7
06/12	7.0	0.0	15.0	85.7	243.8	62.0	0.3	0.0	0.4	1.7	4.7	2.4
06/13	17.0	0.0	23.3	104.8	331.1	82.5	0.7	0.0	0.6	2.1	6.4	3.2
06/14	27.4	0.0	51.8	107.6	350.3	89.7	1.2	0.0	1.2	2.2	6.8	3.4
06/15	29.9	0.0	57.6	117.4	395.4	125.6	1.3	0.0	1.4	2.4	7.6	4.8
06/16	44.8	0.0	69.4	159.4	421.0	149.8	1.9	0.0	1.7	3.3	8.1	5.7
06/17	52.6	0.0	78.7	281.0	476.6	154.2	2.2	0.0	1.9	5.7	9.2	5.9
06/18	63.3	2.7	78.7	321.8	671.3	202.9	2.7	0.2	1.9	6.6	12.9	7.8
06/19	68.3	2.7	87.5	327.7	831.7	270.8	2.9	0.2	2.1	6.7	16.0	10.4
06/20	99.6	5.4	125.5	387.7	881.4	314.7	4.2	0.4	3.0	7.9	17.0	12.1
06/21	140.7	8.3	171.4	412.1	1024.9	390.5	5.9	0.6	4.1	8.4	19.8	15.0
06/22	215.9	16.5	295.1	612.6	1276.0	446.4	9.1	1.2	7.0	12.5	24.6	17.1
06/23	224.9	24.6	402.6	715.1	1522.3	525.0	9.4	1.9	9.6	14.6	29.3	20.1
06/24	245.3	89.8	553.9	763.1	1608.0	691.8	10.3	6.8	13.2	15.6	31.0	26.5
06/25	302.1	204.6	623.5	828.9	1623.9	900.2	12.7	15.4	14.9	16.9	31.3	34.5
06/26	307.3	207.2	710.6	928.4	1687.1	1011.4	12.9	15.6	16.9	19.0	32.5	38.8
06/27	424.5	231.8	841.9	1015.3	1992.7	1145.2	17.8	17.5	20.1	20.7	38.4	43.9
06/28	608.2	259.8	1046.1	1120.3	2101.2	1222.9	25.5	19.6	24.9	22.9	40.5	46.9
06/29	831.6	262.8	1164.3	1388.5	2209.5	1345.4	34.9	19.8	27.7	28.4	42.6	51.6
06/30	865.3	315.2	1637.0	1634.5	2298.0	1451.7	36.3	23.7	39.0	33.4	44.3	55.6
07/01	1001.1	380.1	1817.3	1786.6	2680.4	1566.9	42.0	28.6	43.3	36.5	51.7	60.0
07/02	1067.6	438.4	1934.9	1906.3	2868.4	1633.3	44.8	33.0	46.1	38.9	55.3	62.6
07/03	1071.0	462.9	1970.6	1940.5	3305.8	1711.2	45.0	34.9	47.0	39.6	63.7	65.6
07/04	1172.1	642.8	1976.5	2002.6	3774.7	1768.3	49.2	48.4	47.1	40.9	72.7	67.8
07/05	1321.6	819.6	2094.9	2179.7	3966.4	1949.9	55.5	61.7	49.9	44.5	76.4	74.7
07/06	1449.2	896.4	2101.3	2568.8	4086.2	2008.9	60.8	67.5	50.1	52.5	78.7	77.0
07/07	1537.2	927.5	2179.8	3031.5	4113.7	2125.5	64.5	69.9	51.9	61.9	79.3	81.5
07/08	1807.2	951.7	2378.7	3069.9	4147.9	2190.5	75.9	71.7	56.7	62.7	79.9	83.9
07/09	1844.7	957.1	2502.1	3341.5	4240.2	2247.4	77.5	72.1	59.6	68.2	81.7	86.1
07/10	1947.9	996.9	2810.3	3549.8	4387.7	2313.8	81.8	75.1	67.0	72.5	84.6	88.7
07/11	1995.7	1022.0	2950.8	3612.4	4471.1	2317.1	83.8	77.0	70.3	73.8	86.2	88.8
07/12	2047.8	1114.9	3018.5	3665.0	4536.1	2323.9	86.0	84.0	71.9	74.8	87.4	89.1
07/13	2086.6	1117.9	3092.2	3751.8	4599.3	2378.3	87.6	84.2	73.7	76.6	88.6	91.1
07/14	2093.2	1123.3	3338.4	4006.8	4636.9	2413.2	87.9	84.6	79.6	81.8	89.4	92.5
07/15	2109.1	1123.3	3372.8	4068.3	4705.8	2423.9	88.6	84.6	80.4	83.1	90.7	92.9
07/16	2124.8	1123.3	3460.2	4101.2	4787.7	2444.3	89.2	84.6	82.5	83.7	92.3	93.7
07/17	2132.2	1126.3	3623.1	4208.0	4851.9	2461.4	89.5	84.9	86.3	85.9	93.5	94.3
07/18	2223.4	1136.6	3756.7	4333.0	4909.2	2484.8	93.4	85.6	89.5	88.5	94.6	95.2
07/19	2247.5	1136.6	3782.2	4535.4	4925.0	2501.1	94.4	85.6	90.1	92.6	94.9	95.8
07/20	2262.2	1136.6	3792.2	4705.6	4954.2	2529.8	95.0	85.6	90.4	96.1	95.5	96.9
07/21	2276.2	1142.2	3808.3	4728.7	4989.8	2542.7	95.6	86.1	90.8	96.6	96.2	97.4
07/22	2291.9	1173.8	3855.0	4740.3	4999.4	2550.1	96.2	88.4	91.9	96.8	96.3	97.7
07/23	2300.5	1183.0	3897.8	4748.3	5005.4	2563.5	96.6	89.1	92.9	97.0	96.5	98.2
07/24	2318.3	1201.6	3947.4	4776.4	5029.6	2563.5	97.3	90.5	94.1	97.5	96.9	98.2
07/25	2322.7	1208.9	3983.4	4817.0	5045.1	2567.8	97.5	91.1	94.9	98.4	97.2	98.4
07/26	2330.4	1213.5	4035.1	4837.0	5057.7	2567.8	97.8	91.4	96.2	98.8	97.5	98.4
07/27	2336.6	1225.4	4068.6	4841.3	5075.2	2567.8	98.1	92.3	97.0	98.9	97.8	98.4
07/28	2340.9	1231.3	4094.6	4847.3	5084.9	2567.8	98.3	92.8	97.6	99.0	98.0	98.4
07/29	2348.0	1233.3	4123.8	4852.0	5097.5	2569.1	98.6	92.9	98.3	99.1	98.2	98.5

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Appendix B.11. (2 of 2)

Date	CPUE						Percent					
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989
07/30	2351.4	1242.7	4142.3	4854.3	5120.4	2569.1	98.7	93.6	98.7	99.1	98.7	98.5
07/31	2359.0	1248.9	4144.3	4855.6	5126.0	2583.2	99.0	94.1	98.8	99.1	98.8	99.0
08/01	2364.9	1250.9	4148.0	4859.9	5131.4	2589.6	99.3	94.2	98.8	99.2	98.9	99.2
08/02	2365.6	1255.3	4155.1	4863.2	5135.3	2597.4	99.3	94.6	99.0	99.3	99.0	99.5
08/03	2367.2	1265.1	4167.5	4872.3	5141.8	2601.2	99.4	95.3	99.3	99.5	99.1	99.7
08/04	2370.0	1268.9	4172.2	4883.5	5144.8	2602.2	99.5	95.6	99.4	99.7	99.2	99.7
08/05	2372.6	1269.9	4172.2	4886.7	5147.6	2602.2	99.6	95.7	99.4	99.8	99.2	99.7
08/06	2378.4	1269.9	4176.8	4890.9	5155.1	2605.2	99.9	95.7	99.5	99.9	99.3	99.8
08/07	2380.1	1270.7	4176.8	4890.9	5174.1	2607.2	99.9	95.7	99.5	99.9	99.7	99.9
08/08	2380.1	1272.4	4181.1	4890.9	5176.9	2607.2	99.9	95.9	99.6	99.9	99.8	99.9
08/09	2380.1	1280.6	4181.1	4893.1	5179.7	2609.5	99.9	96.5	99.6	99.9	99.8	100.0
08/10	2380.1	1280.6	4181.1	4895.4	5184.0	2609.5	99.9	96.5	99.6	100.0	99.9	100.0
08/11	2380.1	1284.6	4183.7	4897.6	5187.2	2609.5	99.9	96.8	99.7	100.0	100.0	100.0
08/12	2380.1	1290.3	4184.7	4897.6	5188.9	2609.5	99.9	97.2	99.7	100.0	100.0	100.0
08/13	2380.1	1290.3	4184.7	4897.6	5188.9	2609.5	99.9	97.2	99.7	100.0	100.0	100.0
08/14	2380.1	1290.3	4187.1	4897.6	5188.9	2609.5	99.9	97.2	99.8	100.0	100.0	100.0
08/15	2380.1	1326.3	4187.1	4897.6	5188.9	2609.5	99.9	99.9	99.8	100.0	100.0	100.0
08/16	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	99.9	100.0	99.8	100.0	100.0	100.0
08/17	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	99.9	100.0	99.8	100.0	100.0	100.0
08/18	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	99.9	100.0	99.8	100.0	100.0	100.0
08/19	2380.1	1327.3	4189.0	4897.6	5188.9	2609.5	99.9	100.0	99.8	100.0	100.0	100.0
08/20	2381.7	1327.3	4196.4	4897.6	5188.9	2609.5	100.0	100.0	100.0	100.0	100.0	100.0
08/21	2381.7 ^a	1327.3 ^b	4196.4 ^c	4897.6 ^d	5188.9	2609.5	100.0	100.0	100.0	100.0	100.0	100.0

t = 7/1 t = 7/4 t = 7/2

^a Estimated passage based on 1984 calibration (448.42 fish/index) is 2,196,182.^b Estimated passage based on 1985 calibration (386.11 fish/index) is 1,891,012.^c Estimated passage based on 1986 calibration (194.38 fish/index) is 951,995.^d Estimated passage based on 1987 calibration (275.55 fish/index) is 1,349,534.

Appendix B.12. Commercial coho salmon catches by week, lower
Kuskokwim River (District 1), 1974-1989.

Year	Date	Catch	Fishermen	Fishermen	
				Hours	Catch/Hr.
1974	Aug 01-02	9,576	267	3,444	2.8
	Aug 05-08	59,090	444	31,968	1.8
	Aug 12-15	58,066	396	28,512	2.0
	Aug 19-22	12,301	263	18,936	0.6
	Aug 26-29	5,360	107	7,704	0.7
	Sept 2-05	430	25	1,815	0.2
	Totals	144,823	516	92,379	1.6
1975	Aug 10	2,357	142	852	2.8
	Aug 04-06	12,500	292	14,016	0.9
	Aug 11-13	18,551	373	17,904	1.0
	Aug 18-20	34,435	388	18,624	1.9
	Aug 25-27	16,277	270	12,960	1.3
	Totals	84,120	533	64,356	1.3
1976	Aug 02-03	10,534	286	6,864	1.5
	Aug 09-11	29,728	400	19,200	1.5
	Aug 16-18	28,664	387	18,576	1.5
	Aug 23-25	14,543	300	14,400	1.0
	Aug 30-31	4,420	174	7,308	0.6
	Totals	87,889	516	66,348	1.3
1977	Aug 01-02	23,987	360	8,640	2.8
	Aug 03-10	91,474	487	23,376	3.9
	Aug 15-16	60,935	438	10,512	5.8
	Aug 18	25,589	378	4,536	5.6
	Aug 22	16,980	361	4,332	3.9
	Aug 25	11,874	264	3,168	3.7
	Aug 29	6,819	204	2,448	2.8
	Totals	237,658	572	57,012	4.2
1978	Aug 01	6,311	297	3,564	1.8
	Aug 04	9,455	364	4,368	2.2
	Aug 08	20,501	433	5,196	3.9
	Aug 11	42,428	485	5,820	7.3
	Aug 15	48,950	476	5,712	8.6
	Aug 18	29,485	434	5,208	5.7
	Aug 22	22,287	396	4,752	4.7
	Aug 25	11,168	293	3,516	3.2
	Aug 29	12,215	250	3,000	4.1
	Totals	202,800	597	41,136	4.9

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Year	Date	Catch	Fishermen	Fishermen	
				Hours	Catch/Hr.
1979	Aug 02	52,276	478	5,736	9.1
	Aug 06	53,797	480	2,880	18.7
	Aug 09	26,422	497	2,982	8.9
	Aug 13	27,915	463	2,778	10.0
	Aug 16	21,675	467	2,802	7.7
	Aug 20	19,445	390	2,340	8.3
	Aug 23	5,376	328	1,968	2.7
	Aug 27	6,342	310	3,720	1.7
	Aug 30	2,182	179	2,148	1.0
	Totals	215,430	613	27,354	7.9
1980	Aug 02	9,889	375	2,250	4.4
	Aug 07	36,126	455	2,730	13.2
	Aug 11	35,178	482	2,892	12.2
	Aug 14	28,211	439	2,634	10.7
	Aug 18	43,748	441	2,646	16.5
	Aug 21	33,274	419	2,514	13.2
	Aug 25	19,264	370	2,220	8.7
	Aug 28	13,484	319	1,914	7.0
	Totals	219,174	586	19,800	11.1
1981	Aug 03	16,184	430	2,580	6.3
	Aug 06	13,885	441	2,646	5.2
	Aug 10	26,972	445	2,670	10.1
	Aug 13	46,252	473	2,838	16.3
	Aug 17	34,739	458	2,748	12.6
	Aug 20	24,184	380	2,280	10.6
	Aug 24	23,771	372	2,232	10.7
	Aug 27	13,785	346	2,076	6.6
	Aug 31	8,096	278	1,668	4.9
	Totals	207,868	586	21,738	9.6
1982	July 29	19,561	416	2,496	7.8
	Aug 02	31,944	388	2,328	13.7
	Aug 05	35,766	455	2,670	13.4
	Aug 09	61,231	442	2,652	23.1
	Aug 12	80,685	449	2,694	29.9
	Aug 16	77,785	420	2,520	30.9
	Aug 19	49,566	403	2,418	20.5
	Aug 23	25,218	349	2,094	12.0
	Aug 26	26,761	314	1,884	14.2
	Aug 30	26,815	302	1,812	14.8
	Totals	435,332	596	23,568	18.5

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<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>	
				<u>Hours</u>	<u>Catch/Hr.</u>
1983	Aug 01	9,767	377	2,262	4.3
	Aug 04	15,389	430	2,580	6.0
	Aug 08	34,541	383	2,298	15.0
	Aug 11	35,268	485	2,910	12.1
	Aug 15	24,072	462	2,772	8.7
	Aug 18	22,822	408	2,448	9.3
	Aug 22	34,918	388	2,328	15.0
	Aug 26	19,039	323	1,938	9.8
	Totals	195,816	577	19,536	10.0
1984	July 30	56,609	459	2,754	20.6
	Aug 02	79,240	401	2,406	32.9
	Aug 06	84,406	542	4,878	17.3
	Aug 09	80,990	523	4,707	17.2
	Aug 13	80,268	504	4,536	17.7
	Aug 16	78,342	502	4,518	17.3
	Aug 20	63,829	491	4,419	14.4
	Aug 23	49,372	481	4,329	11.4
	Aug 27	16,472	350	3,150	5.2
	Aug 30	11,222	210	1,890	5.9
	Sept 03	1,603	69	360	4.5
	Sept 06	1,877	39	234	8.0
	Totals	604,230	619	38,181	15.8
1985	Aug 01	34,052	487	2,922	11.7
	Aug 05	54,819	527	3,162	17.3
	Aug 08	78,149	525	3,150	24.8
	Aug 12	77,809	530	3,180	24.5
	Aug 15	28,013	441	2,646	10.6
	Aug 19	19,316	406	2,436	7.9
	Aug 22	17,534	390	2,340	7.5
	Aug 26	10,688	297	1,782	6.0
	Aug 29	9,568	262	1,572	6.1
	Totals	329,948	627	23,190	14.2
1986	July 31	27,553	352	2,112	13.0
	Aug 04	96,127	530	3,180	30.2
	Aug 07	127,024	600	5,400	23.5
	Aug 11	82,215	553	3,318	24.8
	Aug 13	92,918	526	3,156	29.4
	Aug 15	55,633	519	3,114	17.9
	Aug 18	51,328	477	2,862	17.9
	Aug 21	50,640	465	2,790	18.2
	Aug 25	37,365	458	2,748	13.6
	Aug 28	16,436	346	2,076	7.9
	Sept 01	5,949	234	1,404	4.2
	Totals	643,188	663	32,160	20.0

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Year	Date	Catch	Fishermen	Fishermen	
				Hours	Catch/Hr.
1987	Aug 06	46,182	590	3,540	13.0
	Aug 13	104,968	604	3,624	29.0
	Aug 17	73,867	595	3,570	20.7
	Aug 19	45,277	585	3,510	12.9
	Aug 21	33,601	540	3,240	10.4
	Aug 24	27,607	500	3,000	9.2
	Aug 27	21,772	479	2,874	7.6
	Aug 31	12,873	364	2,184	5.9
	Sept 03	11,352	278	1,668	6.8
	Sept 07	4,311	132	792	5.4
Totals		381,810	694	28,002	13.6
1988	June 16	0	602	4,816	0
	June 20	0	612	3,672	0
	June 24	0	644	3,864	0
	June 28	0	609	3,654	0
	July 02	0	580	3,480	0
	July 05	9	579	3,474	0
	July 08	1	604	3,624	0
	July 11	24	598	3,588	0.0
	July 14	141	597	3,582	0.04
	July 18	502	575	3,450	0.14
	July 21	1,278	539	3,234	0.39
	July 25	6,323	494	2,964	2.13
	July 28	20,970	552	3,312	6.33
	Aug 01	33,954	594	3,564	9.53
	Aug 04	76,576	639	3,834	19.97
	Aug 08	76,345	640	3,840	19.88
	Aug 10	53,874	596	3,576	15.06
	Aug 12	84,700	624	3,744	22.62
	Aug 15	59,724	613	3,678	16.23
	Aug 18	37,415	620	3,720	10.06
	Aug 20	24,046	577	3,462	6.95
	Aug 27	22,683	532	3,192	7.10
	Aug 31	12,264	412	2,472	4.96
Total		510,829	746	81,796	6.24

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Year	Date	Catch	Fishermen	Fishermen	Catch/Hr.
				Hours	
1989	June 19	0	374	2,988	0
	June 23	0	277	2,218	0
	June 26	0	126	1,006	0
	June 30	0	642	5,129	0
	July 03	0	629	3,770	0
	July 05	3	553	3,311	0
	July 08	9	621	3,733	0
	July 11	126	616	3,676	0.03
	July 14	230	590	3,576	0.06
	July 18	2,216	437	2,630	0.85
	July 27	5,651	562	3,364	1.68
	Aug 03	99,022	679	5,432	18.23
	Aug 07	73,514	642	3,853	19.08
	Aug 09	103,158	644	3,864	26.70
	Aug 12	81,970	650	3,900	21.02
	Aug 15	23,071	616	3,697	6.24
	Aug 18	5,938	381	2,284	2.60
	Aug 23	30,940	528	3,167	9.77
	Aug 26	20,881	508	4,063	5.14
	Aug 29	11,080	423	3,388	3.27
	Sept 01	3,225	194	1,421	2.77
Total		461,034	745	70,470	6.54

- a The catch totals exclude small numbers of chinook salmon taken in late July and August.
- b Unrestricted mesh size.
- c Preliminary harvest figures

Appendix B.13. Kuskokwim River chinook salmon return per spawner index, 1976-1989.

Brood Year	Escapement Index ^a	Return Index by Age ^b					Total	Return/Spawner Index
		3	4	5	6	7		
1976	22,771	0	11,946	40,364	72,973	5,928	131,211	5.8
1977	12,670	0	2,917	26,883	54,606	10,062	94,468	7.5
1978	42,799	0	13,398	20,508	38,952	4,169	77,027	1.8
1979	32,212	333	21,526	23,614	27,585	4,777	77,835	2.4
1980	24,290	1,865	10,097	29,435	30,856	2,772	75,025	3.1
1981	48,546	285	23,282	33,847	64,879	7,298	129,591	2.6
1982	27,690	0	3,285	16,404	22,323	8,983	50,995	1.8
1983	8,878	416	21,753	58,185	41,083			
1984	13,829	0	32,066	31,142				
1985	13,669	0	38,448					
1986	11,742							
1987	18,945							
1988	27,827							
1989	32,599							

^a Aerial survey index plus Kogrukluk Weir estimate.

^b Total commercial and subsistence catch by age, based primarily on commercial catch sample in District 1. Age 8 fish were excluded due to their rare occurrence. The year of return is obtained by adding the age to the brood year.

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Appendix B.14. Comparative chinook salmon catches by fishing period
by year in District 2, Middle Kuskokwim River,
1985 - 1989.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	136	8	48	2.83
	June 24	263	11	66	3.98
	June 27	548	12	72	7.61
	July 01	779	15	90	8.66
	July 04	0	0	0	0
	Aug. 08	0	6	48	0
	Aug. 12	3	14	84	0.04
	Aug. 15	1	11	66	0.00
Total		1,730	23	474	3.65
1986	June 26	186	3	18	10.33
	June 30	386	13	78	4.95
	July 03	168	8	48	3.50
	July 07	117	2	12	9.75
	July 10	45	6	36	1.25
	Aug. 07	0	8	48	0.00
	Aug. 11	0	10	60	0.00
	Aug. 13	0	10	60	0.00
	Aug. 15	1	27	162	0.01
	Aug. 18	1	8	48	0.02
	Aug. 21	0	6	36	0.00
Total		904	43	606	1.49
1987	July 03	1,325	15	90	14.72
	July 07	935	22	132	7.08
	Aug. 13	4	14	84	0.05
	Aug. 17	6	14	84	0.07
	Aug. 19	1	13	78	0.01
	Aug. 21	1	18	108	0.01
Total		2,272	29	576	3.94
1988	June 24	669	13	78	8.58
	June 28	746	17	102	7.31
	July 02	468	19	114	4.11
	Aug 08	6	14	84	0.07
	Aug 10	10	16	96	0.10
	Aug 12	3	20	120	0.03
	Aug 15	1	21	126	0.01
	Aug 18	2	15	90	0.02
	Aug 20	1	17	102	0.01
Total		1,906	29	912	2.25

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Appendix B.14. (page 2 of 2)

YEAR	DATE	CATCH	NUMBER OF FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1989	June 30	610	15	120	5.08
	July 03	371	18	108	1.22
	July 05	264	14	84	1.00
	July 11	3	14	84	0.46
	Aug 07	3	22	132	0.02
	Aug 09	1	18	108	0.01
	Aug 15	3	15	90	0.01
	Aug 18	7	20	120	0.00
Total		1,262	30	846	1.66

Appendix B.15. Comparative sockeye salmon catches by fishing period
by year in District 2, Middle Kuskokwim River,
1985 - 1989.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	115	8	48	2.40
	June 24	340	11	66	5.15
	June 27	739	12	72	10.26
	July 01	1,100	15	90	12.22
	July 04	0	0	0	0
	Aug. 08	0	6	48	0.00
	Aug. 12	0	14	84	0.00
	Aug. 15	0	11	66	0.00
Total		2,294	23	474	4.84
1986	June 26	616	3	18	34.22
	June 30	1,171	13	78	15.01
	July 03	265	8	48	5.52
	July 07	26	2	12	2.17
	July 10	179	6	36	4.97
	Aug. 07	0	8	48	0.00
	Aug. 11	0	10	60	0.00
	Aug. 13	1	10	60	0.02
	Aug. 15	0	27	162	0.00
	Aug. 18	0	8	48	0.00
	Aug. 21	0	6	36	0.00
Total		904	43	606	1.49
1987	July 03	511	15	90	5.68
	July 07	1,459	22	132	11.05
	Aug. 13	1	14	84	0.01
	Aug. 17	0	14	84	0.00
	Aug. 19	0	13	78	0.00
	Aug. 21	0	18	108	0.00
Total		1,971	29	576	3.42
1988	June 24	1,041	13	78	13.35
	June 28	639	17	102	6.26
	July 02	579	19	114	5.08
	Aug 08	0	14	84	0.00
	Aug 10	0	16	96	0.00
	Aug 12	2	20	120	0.02
	Aug 15	0	21	126	0.00
	Aug 18	0	15	90	0.00
	Aug 20	0	17	102	0.00
Total		1,906	29	912	2.75

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Appendix B.15. (page 2 of 2)

YEAR	DATE	CATCH	NUMBER OF FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1989	June 30	587	15	120	4.89
	July 03	238	18	108	2.20
	July 05	176	14	84	2.10
	July 11	95	14	84	1.13
	Aug 07	0	22	132	0.00
	Aug 09	0	18	108	0.00
	Aug 15	0	15	90	0.00
	Aug 18	0	20	120	0.00
Total		1,096	30	846	1.29

Appendix B.16. Comparative chum salmon catches by fishing period
by year in District 2, Middle Kuskokwim River,
1985 - 1989.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	647	8	48	13.48
	June 24	2,411	11	66	36.53
	June 27	2,263	12	72	31.43
	July 01	2,854	15	90	31.71
	July 04	0	0	0	0
	Aug. 08	41	6	48	1.14
	Aug. 12	45	14	84	0.54
	Aug. 15	9	11	66	0.14
Total		8,270	23	474	17.44
1986	June 26	439	3	18	24.39
	June 30	1,619	13	78	20.76
	July 03	1,249	8	48	26.02
	July 07	387	2	12	32.25
	July 10	1,282	6	36	35.61
	Aug. 07	0	8	48	0.00
	Aug. 11	23	10	60	0.38
	Aug. 13	13	10	60	0.22
	Aug. 15	0	27	162	0.00
	Aug. 18	0	8	48	0.00
	Aug. 21	0	6	36	0.00
Total		5,012	43	606	8.27
1987	July 03	3,200	15	90	35.56
	July 07	4,152	22	132	31.45
	Aug. 13	304	14	84	3.62
	Aug. 17	102	14	84	1.21
	Aug. 19	39	13	78	0.50
	Aug. 21	40	18	108	0.37
Total		7,837	29	576	13.61

-Continued-

Appendix B.16. (page 2 of 2)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 24	4,232	13	78	54.26
	June 28	6,087	17	102	59.68
	July 02	8,155	19	114	71.54
	Aug 08	308	14	84	3.67
	Aug 10	312	16	96	3.25
	Aug 12	244	20	120	2.03
	Aug 15	144	21	126	1.14
	Aug 18	116	15	90	1.29
	Aug 20	94	17	102	0.92
Total		19,692	29	912	21.97
1989	June 30	7,353	15	120	61.28
	July 03	5,101	18	108	47.23
	July 05	3,542	14	84	42.17
	July 11	4,580	14	84	54.52
	Aug 07	238	22	132	1.80
	Aug 09	114	18	108	1.06
	Aug 15	7	15	90	0.08
	Aug 18	11	20	120	0.09
Total		20,946	30	846	26.03

Appendix B.17. Comparative coho salmon catches by fishing period
by year in District 2, Middle Kuskokwim River,
1985 - 1989.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	0	8	48	0.00
	June 24	0	11	66	0.00
	June 27	0	12	72	0.00
	July 01	0	15	90	0.00
	July 04	0	0	0	0
	Aug. 08	739	6	48	20.53
	Aug. 12	2,914	14	84	34.69
	Aug. 15	2,005	11	66	30.38
Total		5,658	23	474	11.94
1986	June 26	0	3	18	0.00
	June 30	0	13	78	0.00
	July 03	0	8	48	0.00
	July 07	0	2	12	0.00
	July 10	0	6	36	0.00
	Aug. 07	2,445	8	48	50.94
	Aug. 11	2,677	10	60	44.62
	Aug. 13	2,787	10	60	46.45
	Aug. 15	5,761	27	162	35.56
	Aug. 18	1,804	8	48	37.58
	Aug. 21	1,325	6	36	36.81
Total		16,799	43	606	27.72
1987	July 03	0	15	90	0.00
	July 07	0	22	132	0.00
	Aug. 13	2,273	14	84	27.06
	Aug. 17	3,374	14	84	40.17
	Aug. 19	3,928	13	78	50.36
	Aug. 21	4,571	18	108	42.32
Total		14,146	29	576	24.56

-Continued-

Appendix B.17. (page 2 of 2)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 24	0	13	78	0.00
	June 28	0	17	102	0.00
	July 02	0	19	114	0.00
	Aug 08	1,465	14	84	17.44
	Aug 10	3,823	16	96	39.82
	Aug 12	5,216	20	120	43.47
	Aug 15	2,317	21	126	18.39
	Aug 18	1,485	15	90	16.50
	Aug 20	1,573	17	102	15.42
Total		19,692	29	912	16.78
1989	June 30	0	15	120	0.00
	July 03	0	18	108	0.00
	July 05	0	14	84	0.00
	July 11	0	14	84	0.00
	Aug 07	6,607	22	132	50.05
	Aug 09	5,714	18	108	52.91
	Aug 15	1,867	15	90	20.74
	Aug 18	2,733	20	120	22.78
Total		16,921	30	846	20.00

Appendix B.18. Utilization of Kuskokwim River chinook salmon, 1960 - 1989.

YEAR	COMMERCIAL HARVEST ^a	ESTIMATED SUBSISTENCE HARVEST ^b	TOTAL UTILIZATION
1960	5,969	20,361	26,330
1961	18,918	30,910	49,828
1962	15,341	14,642	29,983
1963	12,016	37,246	49,262
1964	17,149	29,017	46,166
1965	21,989	27,143	49,132
1966	25,545	49,606	75,151
1967	29,986	57,875	87,861
1968	34,278	30,230	64,508
1969	43,997	40,138	84,135
1970	39,290	69,204	108,494
1971	40,274	42,926	83,200
1972	39,454	40,145	79,599
1973	32,838	38,526	71,364
1974	18,664	26,665	45,329
1975	21,720	47,784	69,504
1976	30,735	58,185	88,920
1977	35,830	55,577	91,407
1978	45,641	35,881	81,522
1979	38,966	55,524	94,490
1980	35,881	59,900	95,781
1981	47,663	59,669	107,332
1982	48,234	53,310	101,544
1983	33,174	52,000	85,174
1984	31,742	57,000	88,742
1985	37,889	42,277	80,166
1986	19,414	51,019	70,433
1987	36,179	67,352	103,504
1988	55,716	53,877	109,593
1989 ^c	43,217	73,035	116,252
Five Year Average (1984-1988)	36,188	54,305	90,493

^a District 1, 2 and 3.

^b Estimated subsistence harvest expanded from villages surveyed.

^c Preliminary harvest figures.

Appendix B.19. Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluk Weir, 1980-1989.

Year	Escapement Estimate	Females	Sex Ratio (% Female)	% of Females with Gill Net Marks
1980	6,572	1,045	15.9	a
1981	16,820	7,905	47.0	12.47
1982	12,185	5,995	49.2	12.99
1983	2,992	865	28.9	16.49
1984	4,928	1,119	22.7	11.08
1985	4,438	1,429	32.2	18.99
1986	4,296	987	23.0	19.43
1987 ^b	4,063			
1988	11,194	3,848	34.4	13.34
1989	11,940	4,127	34.6	16.46
1980-84 Average			32.74	10.61
1985-89 Average			31.05	17.06

a Gill net mark data was not reported.

b Sample sizes were too small to assess sex ratios and percentages of gill net marks.

Appendix B.20. Estimated swimming speed of salmon in the Kuskokwim River.

<u>Tagged at Tuluksak, 1961^a</u>	<u>AVG/DAY</u>	<u>RANGE</u>
Chinook Salmon	11.5	6.0 - 16.0
Sockeye Salmon	7.7	4.9 - 16.0
Coho Salmon	9.7	3.6 - 13.2
Chum Salmon	12.2	3.4 - 48.0
Pink Salmon	13.2	3.0 - 26.0

<u>Tagged at Tuluksak, 1962^b</u>	
Chinook Salmon	7.07
Sockeye Salmon	11.16
Coho Salmon	N/A
Chum Salmon	13.66
Pink Salmon	14.22

Note comparison of peak catch indicated chinook salmon travel time of 20 miles per day.

<u>Tagged at Enarayak, 7 mi upstream Eek Island^c</u>		
Chinook Salmon	7.7	3.3 - 19.6
Sockeye Salmon	7.0	5.1 - 10.6
Chum Salmon	6.2	5.1 - 36.0

Peak subsistence catches at seven locations Napakiak to Crooked Creek indicate migration speed in 1962 was:

Chinook Salmon	16.7
Sockeye Salmon	23.0
Chum Salmon	13.6

Tagged at Eek Test Fishery, Bethel Test Fishery, and vicinity of Bethel, 1989^d

Chinook Salmon	8.4	0.25 - 34.0
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- a Source: AYK Regional Kuskokwim Stock Separation Report No. 1
 b Source: AYK Regional Kuskokwim Stock Separation Report No. 2
 c Source: AYK Regional Kuskokwim Stock Separation Report No. 3
 d source: Pilot Inventory of the Chinook Salmon Stocks of the Kuskokwim River Basin, Yukon Delta National Wildlife Refuge, 1989 Preliminary Summary

Age composition	Local years of life at maturity				Total
	1	2	3	4+	
1982 commercial sample size: 307					
Male	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0	0.0
Commercial	0	0	0	0	0
Harvest	1,081	14,736	4,143	641	22,100
1982 no escapement - chukchee salmon samples were collected.					
1983 commercial sample size: 158					
Male	0.4	0.4	0.4	0.4	0.4
Female	0.0	0.0	0.0	0.0	0.0
Combined	0.4	0.4	0.4	0.4	0.4
Commercial	0	0	0	0	0
Harvest	186	11,040	3,201	29,826	44,253
1983 escapement - chukchee salmon samples only					
Male	0.2	0.2	0.2	0.2	0.2
Female	0.0	0.0	0.0	0.0	0.0
Combined	0.2	0.2	0.2	0.2	0.2
Escapement	148	3,403	6,228	32,231	42,010
1984 commercial sample size: 283					
Male	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0	0.0
Commercial	0	0	0	0	0
Harvest	4,038	18,239	8,379	1,992	32,652
1984 escapement - chukchee salmon samples only					
Male	1.2	1.2	1.2	1.2	1.2
Female	0.0	0.0	0.0	0.0	0.0
Combined	1.2	1.2	1.2	1.2	1.2
Escapement	574	1,912	32,973	14,448	50,907
1985 commercial sample size: 106					
Male	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0	0.0
Commercial	0	0	0	0	0
Harvest	4,847	7,114	16,721	699	29,381

-Continued-

Appendix C.1. Historical age composition percentage, chinook salmon,
Quinhagak commercial harvest and escapement, 1982 - 1989.

	Total years of life at maturity ^a .					
Age composition	3	4	5	6	7+	Total
1982 commercial sample size:	309					
Male	0.0	3.6	33.3	9.4	1.3	47.6
Female	0.0	1.3	31.1	18.4	1.6	52.4
Combined	0.0	4.9	64.4	27.8	2.9	100.0
Commercial Harvest ^b	0	1,083	14,236	6,145	641	22,106
1982 no escapement sockeye salmon samples were collected.						
1983 commercial sample size:	758					
Male	0.4	25.9	6.1	27.3	1.5	61.2
Female	0.0	0.1	0.8	37.0	0.9	38.8
Combined	0.4	26.0	6.9	64.3	2.4	100.0
Commercial Harvest ^b	186	12,060	3,201	29,826	1,113	46,385
1983 escapement sample size:	580					
Carcass samples only.						
Male	0.3	6.7	10.9	29.7	1.0	48.6
Female	0.0	0.2	2.4	45.8	3.0	51.4
Combined	0.3	6.9	13.3	75.5	4.0	100.0
Estimated Escapement ^c	148	3,403	6,558	37,231	1,972	49,312
1984 commercial sample size:	583					
Male	0.0	12.0	52.7	14.8	3.9	83.4
Female	0.0	0.0	1.5	10.1	5.0	16.6
Combined	0.0	12.0	54.2	24.9	8.9	100.0
Commercial Harvest ^b	0	4,038	18,239	8,379	2,995	33,652
1984 escapement sample size:	545					
Carcass samples only.						
Male	1.5	5.0	34.0	20.0	2.6	63.1
Female	0.0	0.0	4.3	28.5	4.1	36.9
Combined	1.5	5.0	38.3	48.5	6.7	100.0
Estimated Escapement ^c	574	1,912	35,973	14,648	18,549	38,245
1985 commercial sample size:	569					
Male	0.0	19.3	20.9	26.7	1.6	59.1
Female	0.0	0.0	2.5	28.3	0.7	40.9
Combined	0.0	19.3	23.4	55.0	2.3	100.0
Commercial Harvest ^b	0	5,867	7,114	16,721	699	30,401

-Continued-

	Total years of life at maturity ^a .					
Age composition	3	4	5	6	7+	Total
1985 escapement sample size: 661						
Combined beach seine (n=131) and carcass (n=530) samples.						
Male	0.6	5.3	11.0	30.6	0.9	48.4
Female	0.0	0.0	3.7	45.5	2.4	51.6
Combined	0.6	5.3	14.7	76.1	3.3	100.0
Estimated Escapement ^c	215	1,895	5,256	27,210	1,180	35,755
1986 commercial sample size: 502 ^d						
Male	2.0	6.0	43.0	16.0	4.0	71.0
Female	0.0	0.0	2.0	19.0	8.0	29.0
Combined	2.0	6.0	45.0	35.0	12.0	100.0
Commercial Harvest ^b	457	1,370	10,276	7,992	2,740	22,835
1986 sport fish sample size: 406 ^d						
Male	0.0	9.3	37.7	10.6	5.9	63.5
Female	0.0	1.5	8.4	18.2	8.4	36.5
Combined	0.0	10.8	46.1	28.8	14.3	100.0
Estimated sport fish Harvest ^e	0	90	385	240	119	835
1986 escapement sample size: 406 ^d						
Combined beach seine (n=31) and carcass (n=168) samples.						
Male	1.5	6.0	21.2	18.1	6.0	52.8
Female	0.0	0.0	6.5	26.6	14.1	47.2
Combined	1.5	6.0	27.7	44.7	20.1	100.0
Escapement ^c	e	e	e	e	e	
1987 commercial sample size:						
Male						
Female						
Combined						
Commercial Harvest ^b	0	0	0	0		
1987 escapement sample size:						
Beach seine samples only.						
Male						
Female						
Combined						
Estimated Escapement ^c	f	f	f	f		

^a The total years of life at maturity are represented by the follow European salmon age designations. European age designate the number of fresh water and marine annuli, respectively.
 Age composition 3 includes 1.1 and small numbers of 0.2.
 Age composition 4 includes 1.2 and small numbers of 0.3.
 Age composition 5 includes 1.3 and small numbers of 0.4.
 Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.
 Age composition 7+ includes age compositions 1.5 and 2.4.

- b Allocations by age class based on that years commercial catch sample results.
- c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Kanektok River salmon side scan sonar project.
- d Preliminary data.
- e Information not available.

1987 escapement sample size: 400					
Escapement	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1987 commercial sample size: 400					
Harvest	0	0	0	0	0
Commercial	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1986 escapement sample size: 400					
Escapement	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1986 commercial sample size: 400					
Harvest	0	0	0	0	0
Commercial	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1985 escapement sample size: 400					
Escapement	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1985 commercial sample size: 400					
Harvest	0	0	0	0	0
Commercial	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1984 escapement sample size: 400					
Escapement	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1984 commercial sample size: 400					
Harvest	0	0	0	0	0
Commercial	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1983 escapement sample size: 400					
Escapement	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1983 commercial sample size: 400					
Harvest	0	0	0	0	0
Commercial	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1982 escapement sample size: 400					
Escapement	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1982 commercial sample size: 400					
Harvest	0	0	0	0	0
Commercial	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1981 escapement sample size: 400					
Escapement	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0
1981 commercial sample size: 400					
Harvest	0	0	0	0	0
Commercial	0	0	0	0	0
Combined	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0	0.0

The total years of life as reported are represented by the following:
 Escapement sample age distribution: Escapement age distribution:
 number of fish and male and female numbers, respectively:
 Age composition 1 includes 1.1 and small numbers of 0.1
 Age composition 2 includes 1.2 and small numbers of 0.2
 Age composition 3 includes 1.3 and small numbers of 0.3
 Age composition 4 includes 1.4 and small numbers of 0.4 and 0.5
 Age composition 5 includes age composition 1.5 and 0.6

Appendix C.2. Kanektok River peak aerial surveys by species,
1959 - 1989^a.

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1960	6,047	34,900		36,100
1961				
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	4,112	3,028		80,100
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		2,936		8,697
1977	5,787	6,304		32,157
1978 ^b	19,180	44,215		229,290
1979				
1980	6,172	113,931	69,325	25,950
1981 ^c	15,900	49,175		71,840
1982 ^d	8,142	55,940		
1983	8,890	2,340		9,360
1984 ^e	12,182	30,840	46,830	48,360
1985	13,465	16,270		14,385
1986	3,643	14,949		16,790
1987	4,223	51,753	20,056	9,420
1988	11,140	30,440		20,063
1989				
AVERAGE:	7,336	30,232	45,404	30,458
OBJECTIVE:	5,000	32,000	25,000	30,500

- a Peak aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Some surveys which do not meet these criteria may be referenced in this table; test are footnoted.
- b Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.
- c Poor survey for chinook, sockeye, chum salmon.
- d Late Survey for chinook, sockeye salmon (after 5 August).
- e Poor coho survey.

Appendix C.3. Historical age composition percentage, sockeye salmon, Quinhagak commercial harvest and escapement, 1982 - 1989.

	Total years of life at maturity ^a				
Age composition	3	4	5	6	Total
1982 commercial sample size:	203				
Male	0.0	17.2	38.0	0.0	55.2
Female	0.0	13.3	31.5	0.0	44.8
Combined	0.0	30.5	69.5	0.0	100.0
Commercial Harvest ^b	0	7,834	17,851	0	25,685
1982 no escapement sockeye salmon samples were collected.					
1983 commercial sample size:	470				
Male	0.0	23.0	20.9	4.0	47.9
Female	0.0	31.0	18.5	2.6	52.1
Combined	0.0	54.0	39.4	6.6	100.0
Commercial Harvest ^b	0	5,542	4,044	677	10,263
1983 no escapement sockeye salmon samples were collected.					
1984 commercial sample size:	531				
Male	0.0	17.1	34.5	4.9	56.5
Female	0.0	10.0	30.1	3.4	43.5
Combined	0.0	27.1	64.6	8.3	100.0
Commercial Harvest ^b	0	4,677	11,149	1,432	17,258
1984 escapement sample size:	382				
Carcass samples only.					
Male	0.3	22.8	36.7	1.5	61.3
Female	0.0	8.9	29.0	0.8	38.7
Combined	0.3	31.7	65.7	2.3	100.0
Estimated Escapement ^c	164	17,357	35,973	1,259	54,754
1985 commercial sample size:	569				
Male	0.0	9.3	40.4	1.6	59.1
Female	0.0	11.9	35.3	1.6	40.9
Combined	0.0	21.2	75.6	3.2	100.0
Commercial Harvest ^b	0	1,666	5,957	252	7,876
1985 escapement sample size:	26				
Combined beach seine (n=12) and carcass (n=14) samples.					
Male	0.0	19.2	27.0	0.0	46.2
Female	0.0	15.4	26.9	11.5	53.8
Combined	0.0	34.6	53.9	11.5	100.0
Estimated Escapement ^c	0	2,166	3,374	720	6,259

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	Total years of life at maturity ^a				
Age composition	3	4	5	6	Total
1986 commercial sample size: 314 ^d					
Male	0.0	11.7	39.2	0.2	51.1
Female	0.0	9.8	39.2	0.0	48.9
Combined	0.0	21.4	78.3	0.2	100.0
Commercial Harvest	0	4,607	16,827	50	21,484
1986 escapement sample size: 79 ^d					
Beach seine samples only					
Male	0.0	10.1	26.6	0.0	36.7
Female	0.0	10.1	50.6	2.6	63.3
Combined	0.0	20.2	77.2	2.6	100.0
Estimated Escapement ^c	e	e	e	e	e
1987 commercial sample size:					
Male	0.0	0.0	0.0	0.0	
Female	0.0	0.0	0.0	0.0	
Combined	0.0	0.0	0.0	0.0	
Commercial Harvest ^b	0	0	0	0	
1987 escapement sample size:					
Beach seine samples only.					
Male					
Female					
Combined					
Estimated Escapement ^c	e	e	e	e	

- a The total years of life at maturity are represented by the follow European salmon age designations. European age designate the number of fresh water and marine annuli, respectively.
 Age composition 3 includes 1.1 and small numbers of 0.2.
 Age composition 4 includes 1.2 and small numbers of 0.3.
 Age composition 5 includes 1.3 and small numbers of 0.4.
 Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.
 Age composition 7+ includes age compositions 1.5 and 2.4.
- b Allocations by age class based on that years commercial catch sample results.
- c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Kanektok River salmon side scan sonar project.
- d Preliminary data.
- e Information not available.

Appendix C.4. Historical age composition percentage, chum salmon, Quinhagak commercial harvest and escapement, 1981 - 1989

Age composition	Total years of life at maturity ^a				Total
	3	4	5	6	
1982 commercial sample size:	414				
Male	1.0	24.6	13.7	1.0	40.3
Female	0.0	38.7	19.6	1.4	59.7
Combined	1.0	63.3	33.3	2.4	100.0
Commercial Harvest ^b	333	21,108	11,104	800	33,346
1982 no escapement chum salmon samples were collected.					
1983 commercial sample size:	482				
Male	0.0	24.7	16.0	0.6	41.3
Female	0.6	34.9	22.8	0.4	58.7
Combined	0.6	59.6	38.8	1.0	100.0
Commercial Harvest ^b	139	13,762	8,959	231	23,090
1983 escapement sample size:	401				
Gillnet samples only					
Male	0.0	15.5	37.6	1.0	54.1
Female	0.2	21.9	23.8	0.0	45.9
Combined	0.2	37.4	61.4	1.0	100.0
Estimated Escapement ^c	108	20,157	33,092	539	53,895
1984 commercial sample size:	464				
Male	0.2	33.8	13.4	0.0	47.4
Female	0.0	39.9	12.1	0.6	52.6
Combined	0.2	73.7	25.5	0.6	100.0
Commercial Harvest ^b	101	37,162	12,858	303	50,424
1984 escapement sample size:	772				
Carcass samples only					
Male	0.1	38.1	17.1	1.2	56.5
Female	0.1	32.0	11.1	0.3	43.5
Combined	0.2	70.1	28.2	1.5	100.0
Estimated Escapement ^c	400	140,298	56,439	3,002	200,140

-continued-

	Total years of life at maturity ^a				
Age composition	3	4	5	6	Total
1985 commercial sample size: 458					
Male	0.0	25.5	21.4	0.2	59.1
Female	0.0	27.5	25.3	0.0	40.9
Combined	0.0	53.0	46.7	0.2	100.0
Commercial Harvest ^b	0	10,822	9,535	41	20,418
1985 escapement sample size: 440					
Combined beach seine (n=150) and carcass (n=290) samples.					
Male	0.2	24.1	27.1	0.0	51.4
Female	0.2	25.7	22.7	0.0	48.6
Combined	0.4	49.8	49.8	0.0	100.0
Estimated Escapement ^c	61	7,632	7,632	0	15,325
1986 commercial sample size: 314 ^d					
Male	0.0	22.6	17.1	0.0	39.7
Female	0.0	41.7	18.6	0.0	60.3
Combined	0.0	64.3	35.7	0.0	100.0
Commercial Harvest ^b	0	19,097	10,603	0	29,700
1986 escapement sample size: 431 ^d					
Beach seine samples only.					
Male	0.2	27.1	28.8	0.9	57.0
Female	0.0	23.0	19.3	0.7	43.0
Combined	0.2	50.1	48.1	1.6	100.0
Estimated Escapement ^c	e	e	e	e	e
1987 commercial sample size:					
Male					
Female					
Combined					
Commercial Harvest ^b	0	0	0	0	
1987 escapement sample size:					
Beach seine samples only.					
Male					
Female					
Combined					
Estimated Escapement ^c	e	e	e	e	

-continued-

- a Total years of life at maturity represents the number of winters development and return of the mature fish for spawning. This is the sum plus one of the two digits used for European notation.
- b Allocations by age class based proportions from commercial catch sample results.
- c Allocations by age class based on escapement sample results. Escapement estimate based on the Kanektok River salmon side scan sonar project.
- d Preliminary data.
- e Information not available.

1985 escapement sample size: 440				
Combined beach seine (n=150) and carcass (n=290)	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0
Commercial	0.0	0.0	0.0	0.0
Harvest	0.0	0.0	0.0	0.0
Escapement	0.0	0.0	0.0	0.0
Estimated	0.0	0.0	0.0	0.0
1985 escapement sample size: 440	0.0	0.0	0.0	0.0
Combined beach seine (n=150) and carcass (n=290)	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0
Commercial	0.0	0.0	0.0	0.0
Harvest	0.0	0.0	0.0	0.0
Escapement	0.0	0.0	0.0	0.0
Estimated	0.0	0.0	0.0	0.0
1986 escapement sample size: 314				
Beach seine samples only	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0
Commercial	0.0	0.0	0.0	0.0
Harvest	0.0	0.0	0.0	0.0
Escapement	0.0	0.0	0.0	0.0
Estimated	0.0	0.0	0.0	0.0
1986 escapement sample size: 431				
Beach seine samples only	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0
Commercial	0.0	0.0	0.0	0.0
Harvest	0.0	0.0	0.0	0.0
Escapement	0.0	0.0	0.0	0.0
Estimated	0.0	0.0	0.0	0.0
1987 commercial sample size:				
Male	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0
Commercial	0.0	0.0	0.0	0.0
Harvest	0.0	0.0	0.0	0.0
1987 escapement sample size:				
Beach seine samples only	0.0	0.0	0.0	0.0
Male	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0
Commercial	0.0	0.0	0.0	0.0
Harvest	0.0	0.0	0.0	0.0
Escapement	0.0	0.0	0.0	0.0
Estimated	0.0	0.0	0.0	0.0

Appendix C.5. Summary of historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981-1989.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
6/12	1	0	0	0	0.00000
6/13	2	14	151	83	0.00093
6/14	0	0	0	0	0.00093
6/15	2	89	134	112	0.00223
6/16	3	0	277	142	0.00528
6/17	1	1119	1119	1119	0.01012
6/18	3	355	468	419	0.02321
6/19	2	171	741	456	0.02810
6/20	2	111	367	239	0.03156
6/21	2	1336	2141	1739	0.04942
6/22	2	379	746	563	0.06463
6/23	3	343	1741	1152	0.08485
6/24	2	638	1595	1117	0.10075
6/25	3	732	1640	1221	0.13813
6/26	2	1717	2300	2009	0.15932
6/27	2	461	543	502	0.17170
6/28	3	1908	2413	2096	0.20506
6/29	1	0	0	0	0.20506
6/30	3	1360	2601	2019	0.25313
7/1	1	975	975	975	0.26689
7/2	4	1242	3121	2029	0.31053
7/3	3	2244	3604	3013	0.38485
7/4	2	627	1201	914	0.40859
7/5	4	1157	2934	2049	0.45033
7/6	1	1126	1126	1126	0.45756
7/7	4	1211	4118	2656	0.51646
7/8	2	1289	2453	1871	0.54728
7/9	3	1532	3048	2359	0.58639
7/10	2	2229	2786	2508	0.61286
7/11	4	1901	3369	2473	0.69825
7/12	2	1468	1601	1535	0.71310
7/13	2	1842	2278	2060	0.73960
7/14	5	878	3465	2102	0.80198
7/15	2	1240	3099	2170	0.83939
7/16	2	564	1293	929	0.84861
7/17	2	937	1502	1220	0.86242
7/18	4	657	1454	1032	0.89219
7/19	1	866	866	866	0.89594
7/20	2	477	1722	1100	0.91007
7/21	4	477	989	739	0.92486
7/22	2	799	1312	1056	0.94194
7/23	2	328	361	345	0.94568
7/24	2	215	907	561	0.95267
7/25	3	0	393	237	0.95674

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Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
7/26	1	0	0	0	0.95674
7/27	5	0	253	152	0.96181
7/28	1	102	102	102	0.96225
7/29	3	126	429	256	0.96746
7/30	2	19	112	66	0.96807
7/31	2	97	210	154	0.96983
8/1	4	42	157	95	0.97313
8/2	2	38	94	66	0.97380
8/3	5	30	272	119	0.97889
8/4	3	3	93	55	0.97971
8/5	4	16	293	124	0.98353
8/6	4	16	153	61	0.98660
8/7	2	30	240	135	0.98831
8/8	5	0	94	25	0.98898
8/9	2	6	34	20	0.98919
8/10	5	10	77	42	0.99123
8/11	3	6	28	20	0.99152
8/12	4	1	103	54	0.99306
8/13	4	0	28	16	0.99361
8/14	3	1	44	21	0.99400
8/15	4	12	42	29	0.99486
8/16	3	0	11	5	0.99496
8/17	5	1	71	25	0.99631
8/18	3	6	11	9	0.99645
8/19	5	2	19	9	0.99686
8/20	3	3	27	13	0.99706
8/21	4	0	23	8	0.99733
8/22	4	1	32	11	0.99773
8/23	3	1	7	3	0.99779
8/24	4	0	16	6	0.99794
8/25	4	1	28	10	0.99830
8/26	4	0	14	5	0.99845
8/27	3	0	7	3	0.99850
8/28	3	0	7	3	0.99863
8/29	4	1	7	5	0.99877
8/30	2	0	0	0	0.99877
8/31	4	0	20	8	0.99918
9/1	4	0	8	3	0.99923
9/2	4	0	14	5	0.99949
9/3	3	0	1	1	0.99950
9/4	3	0	18	8	0.99985
9/5	4	0	16	4	0.99993
9/6	2	0	1	1	0.99994
9/7	4	0	5	1	0.99997
9/8	3	0	3	1	1.00000

Appendix C.6. Summary of historical commercial harvest by period, Quinhagak District, chum salmon, 1981-1989.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
6/12	1	0	0	0	0.00000
6/13	2	84	1092	588	0.00456
6/14	0	0	0	0	0.00456
6/15	2	1008	1122	1065	0.00982
6/16	3	0	847	545	0.01683
6/17	1	1556	1556	1556	0.02201
6/18	3	1162	2611	1861	0.04653
6/19	2	1198	1913	1556	0.05641
6/20	2	746	968	857	0.06451
6/21	2	2278	4471	3375	0.08195
6/22	2	1051	2177	1614	0.10013
6/23	3	1103	3226	2034	0.12251
6/24	2	1403	3228	2316	0.14476
6/25	3	1711	5417	3578	0.18642
6/26	2	1529	4329	2929	0.20693
6/27	2	1855	1874	1865	0.22605
6/28	3	2458	5449	4203	0.26533
6/29	1	0	0	0	0.26533
6/30	3	2066	4903	3610	0.32042
7/1	1	2131	2131	2131	0.33202
7/2	4	1972	6034	3961	0.37567
7/3	3	1788	3743	2497	0.42015
7/4	2	2333	3155	2744	0.44855
7/5	4	1820	6778	3667	0.49239
7/6	1	2953	2953	2953	0.49854
7/7	4	2939	4016	3433	0.54885
7/8	2	3231	3672	3452	0.58040
7/9	3	3830	7408	5616	0.62095
7/10	2	4022	4774	4398	0.64946
7/11	4	2552	4567	3256	0.69887
7/12	2	3211	3742	3477	0.72039
7/13	2	4270	7438	5854	0.74530
7/14	5	732	3080	1922	0.78313
7/15	2	2796	10756	6776	0.82075
7/16	2	1784	2193	1989	0.83199
7/17	2	2326	3218	2772	0.84740
7/18	4	1310	4343	2771	0.88448
7/19	1	2339	2339	2339	0.89227
7/20	2	2256	3934	3095	0.90544
7/21	4	1143	1941	1573	0.92653
7/22	2	1668	2219	1944	0.94068
7/23	2	791	1316	1054	0.94621
7/24	2	499	1280	890	0.95029
7/25	3	0	1397	737	0.95646

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Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
7/26	1	0	0	0	0.95646
7/27	5	0	677	384	0.96269
7/28	1	333	333	333	0.96380
7/29	3	353	797	542	0.96909
7/30	2	173	232	203	0.97024
7/31	3	5	191	128	0.97119
8/1	4	246	429	299	0.97613
8/2	2	153	185	169	0.97716
8/3	5	110	580	259	0.98308
8/4	3	4	134	85	0.98387
8/5	4	98	357	224	0.98736
8/6	4	52	285	136	0.99184
8/7	2	101	114	108	0.99236
8/8	5	0	132	57	0.99322
8/9	2	11	33	22	0.99335
8/10	5	16	108	66	0.99551
8/11	3	4	37	23	0.99574
8/12	4	15	53	40	0.99636
8/13	4	2	53	21	0.99676
8/14	3	13	37	25	0.99700
8/15	4	6	53	28	0.99740
8/16	3	2	23	11	0.99755
8/17	5	2	50	21	0.99825
8/18	3	7	9	8	0.99834
8/19	5	5	15	10	0.99862
8/20	3	3	14	9	0.99871
8/21	4	2	11	7	0.99887
8/22	4	1	18	9	0.99902
8/23	3	3	10	7	0.99911
8/24	4	0	7	4	0.99921
8/25	4	0	5	4	0.99927
8/26	4	0	9	5	0.99942
8/27	3	0	2	1	0.99944
8/28	3	2	4	3	0.99951
8/29	4	0	3	2	0.99954
8/30	2	0	1	1	0.99954
8/31	4	0	10	4	0.99969
9/1	4	0	2	1	0.99970
9/2	4	0	7	3	0.99980
9/3	3	0	0	0	0.99980
9/4	3	0	13	4	0.99997
9/5	4	0	5	1	0.99999
9/6	2	0	0	0	0.99999
9/7	4	0	2	1	1.00000
9/8	3	0	0	0	1.00000

Appendix C.7. Quinhagak District commercial salmon harvest, 1960-1989.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,557	160	53,334	142,867
1982	22,106	25,685	73,652	11,838	33,346	166,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,652	17,258	135,342	16,249	50,424	252,925
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	13,872	21,534	68,591	21,258	29,183	154,438
1989	20,820	20,582	44,607	273	39,395	125,677
Five Year Average (1984-1988)	25,356	14,928	68,308	9,260	27,656	145,508

Appendix C.8. Summary of historical commercial harvest by period,
Quinhagak District, chinook salmon, 1981-1989.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
6/12	1	0	0	0	0.00000
6/13	2	1716	7720	4718	0.03223
6/14	0	0	0	0	0.03223
6/15	2	2948	3415	3182	0.06381
6/16	3	0	7835	3005	0.09201
6/17	1	3527	3527	3527	0.10974
6/18	3	6694	11997	8768	0.21219
6/19	2	3525	5801	4663	0.25923
6/20	2	803	6617	3710	0.28984
6/21	2	4268	5458	4863	0.32931
6/22	2	4002	10586	7294	0.39265
6/23	3	2039	11652	6656	0.46198
6/24	2	5406	6698	6052	0.51363
6/25	3	3719	4539	4123	0.56344
6/26	2	1703	1741	1722	0.58101
6/27	2	3795	9711	6753	0.61815
6/28	3	1438	4089	2937	0.66894
6/29	1	0	0	0	0.66894
6/30	3	690	4496	2124	0.70009
7/1	1	3752	3752	3752	0.71380
7/2	4	1204	1902	1713	0.74966
7/3	3	2018	2771	2369	0.78417
7/4	2	2727	4068	3398	0.80557
7/5	4	850	2710	1360	0.83517
7/6	1	996	996	996	0.83968
7/7	4	960	1566	1319	0.86242
7/8	2	918	2407	1663	0.87856
7/9	3	739	1259	963	0.89054
7/10	2	646	736	691	0.89757
7/11	4	621	1545	1160	0.91518
7/12	2	450	687	569	0.92103
7/13	2	639	1011	825	0.92727
7/14	5	220	1351	651	0.94184
7/15	2	1236	1306	1271	0.95221
7/16	2	441	533	487	0.95635
7/17	2	222	290	256	0.95874
7/18	4	202	845	438	0.96524
7/19	1	390	390	390	0.96720
7/20	2	412	490	451	0.97078
7/21	4	131	248	186	0.97506
7/22	2	211	629	420	0.97752
7/23	2	88	324	206	0.97903
7/24	2	83	187	135	0.98032
7/25	3	0	379	171	0.98266

-Continued-

Appendix C.8. (page 2 of 2)

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
7/26	1	0	0	0	0.98266
7/27	5	0	194	95	0.98472
7/28	1	56	56	56	0.98500
7/29	3	103	116	108	0.98661
7/30	2	73	104	89	0.98737
7/31	3	0	46	29	0.98780
8/1	4	54	153	92	0.98916
8/2	2	45	53	49	0.98967
8/3	5	40	160	80	0.99133
8/4	3	0	30	19	0.99162
8/5	4	40	141	74	0.99275
8/6	4	25	78	42	0.99346
8/7	2	27	43	35	0.99380
8/8	5	0	71	28	0.99456
8/9	2	6	22	14	0.99471
8/10	5	19	125	58	0.99576
8/11	3	6	15	10	0.99591
8/12	4	24	74	47	0.99673
8/13	4	0	36	15	0.99695
8/14	3	6	29	16	0.99716
8/15	4	8	43	29	0.99769
8/16	3	1	10	6	0.99776
8/17	5	2	66	24	0.99823
8/18	3	9	10	10	0.99838
8/19	5	3	51	19	0.99875
8/20	3	6	10	7	0.99884
8/21	4	4	13	7	0.99897
8/22	4	3	33	13	0.99918
8/23	3	1	5	4	0.99923
8/24	4	3	14	7	0.99936
8/25	4	1	16	7	0.99946
8/26	4	5	17	9	0.99966
8/27	3	3	4	3	0.99971
8/28	3	3	8	5	0.99977
8/29	4	1	7	4	0.99984
8/30	2	0	1	1	0.99984
8/31	4	0	3	2	0.99988
9/1	4	0	10	3	0.99991
9/2	4	0	4	2	0.99993
9/3	3	0	2	1	0.99995
9/4	3	2	2	2	0.99997
9/5	4	0	2	1	1.00000
9/6	2	0	1	1	1.00000
9/7	4	0	0	0	1.00000
9/8	3	0	0	0	1.00000

Appendix C.9. Quinhagak District commercial effort 1970-1989.

YEAR	Cumulative proportion delivered	Average harvest	EFFORT ^a	Maximum harvest	Minimum harvest	No. Years w/ fishing period on this date	Date
1970			88			1	7/56
1971			61			2	7/57
1972	0.98266	0	107		0	1	7/58
1973	0.98475	22	109		0	2	7/59
1974	0.98800	26	196		26	1	7/60
1975	0.98861	108	127		26	1	7/61
1976	0.98737	59	181	103	103	3	7/62
1977	0.98780	59	258	73	73	5	7/63
1978	0.98716	93	200	0	0	3	7/64
1979	0.98967	49	206	24	24	4	8/1
1980	0.99133	60	169	42	42	5	8/2
1981	0.99162	19	186	40	40	2	8/3
1982	0.99275	74	117	0	0	3	8/4
1983	0.99346	45	226	40	40	4	8/5
1984	0.99380	32	263	56	56	4	8/6
1985	0.99486	50	300	37	37	5	8/7
1986	0.99471	14	324	0	0	2	8/8
1987	0.99276	58	310	0	0	5	8/9
1988	0.99281	10	288	19	19	6	8/10
1989	0.99373	17	227	0	0	3	8/11
FIVE YEAR AVERAGE (1984-1988)			297	0	0	4	8/12

a Permits that made at least one delivery during that year.

Appendix C.10. Summary of historical commercial harvest by period,
Quinhagak District, coho salmon, 1979-1989.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
6/30	4	0	2	1	0.00000
7/1	1	0	0	0	0.00000
7/2	6	0	1	0	0.00000
7/3	3	0	0	0	0.00000
7/4	4	0	0	0	0.00000
7/5	4	0	0	0	0.00000
7/6	2	0	0	0	0.00000
7/7	5	0	0	0	0.00000
7/8	2	0	0	0	0.00000
7/9	5	0	4	1	0.00001
7/10	2	0	5	3	0.00001
7/11	6	0	9	2	0.00002
7/12	2	0	2	1	0.00002
7/13	3	0	7	2	0.00003
7/14	6	0	2	1	0.00004
7/15	2	0	18	9	0.00009
7/16	4	0	39	13	0.00013
7/17	2	4	14	9	0.00016
7/18	6	0	234	50	0.00046
7/19	1	88	88	88	0.00057
7/20	3	3	787	267	0.00114
7/21	5	0	366	126	0.00206
7/22	2	1	12	7	0.00209
7/23	4	0	1386	440	0.00351
7/24	2	47	63	55	0.00373
7/25	5	0	3482	842	0.00720
7/26	1	0	0	0	0.00720
7/27	6	0	5512	1053	0.01243
7/28	2	352	1214	783	0.01444
7/29	3	152	565	376	0.01640
7/30	4	0	3079	1603	0.02315
7/31	3	146	925	428	0.02568
8/1	6	0	5680	1674	0.03868
8/2	2	962	2806	1884	0.04410
8/3	6	713	5390	2149	0.06117
8/4	3	190	1755	936	0.06630
8/5	5	934	4517	2397	0.08821
8/6	6	2139	8436	4458	0.12335
8/7	2	693	8188	4441	0.14136
8/8	6	0	19215	6322	0.18401
8/9	2	5295	5676	5486	0.20180
8/10	6	2429	9428	5566	0.25238
8/11	4	3863	10076	7029	0.29620
8/12	4	2857	3894	3287	0.32645

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Appendix C.10. (page 2 of 2)

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
8/13	6	1561	10961	5464	0.37073
8/14	3	1671	3543	2784	0.39087
8/15	6	1603	15733	8426	0.45670
8/16	3	1403	4643	2556	0.47581
8/17	6	2008	9785	4610	0.51782
8/18	4	6197	9776	7817	0.56705
8/19	5	2532	5019	3884	0.60835
8/20	5	3958	8728	6199	0.64910
8/21	4	2110	3662	2946	0.67470
8/22	6	1972	5231	4008	0.71000
8/23	3	2400	5873	3605	0.72985
8/24	5	1708	8673	4029	0.75839
8/25	5	1633	6095	4068	0.79342
8/26	4	1419	4825	3878	0.82138
8/27	5	2687	5975	3902	0.84726
8/28	3	1514	3737	2668	0.86399
8/29	6	1731	3623	2889	0.89193
8/30	2	1054	9431	5243	0.90676
8/31	5	1524	3382	2488	0.92576
9/1	4	1407	2365	1901	0.94089
9/2	4	535	4065	2196	0.95760
9/3	4	600	2717	1589	0.96530
9/4	3	1177	2058	1675	0.97605
9/5	6	0	3799	1382	0.98664
9/6	2	950	1158	1054	0.99153
9/7	4	0	1798	692	0.99646
9/8	2	0	1262	631	1.00000

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Appendix D.1. Peak aerial survey results, Goodnews River, 1979-1989.

<u>Year</u>	<u>Species</u>	<u>Goodnews River^a</u>	<u>Middle Fork^b</u>	<u>South Fork</u>	<u>Total</u>
1979	Chinook	635	1,032	c	1,667
	Sockeye	987	1,166	c	2,153
	Chum	8,349	3,375	c	11,724
1980	Chinook	1,228	1,164	c	2,392
	Sockeye	41,576	18,596	c	60,172
	Chum	1,975	3,782	c	5,757
1981	Chinook	c	c	c	c
	Sockeye	c	c	c	c
	Chum	c	c	c	c
1982	Chinook	1,990	1,546	c	3,536
	Sockeye	19,160	2,327	c	21,487
	Chum	9,700	6,300	c	16,000
1983	Chinook	2,600	2,500	141	5,241
	Sockeye	9,650	5,900	50	15,600
	Chum	c	c	c	c
1984	Chinook	3,235	2,020	6	5,261
	Sockeye	9,240	12,897	0	22,137
	Chum	17,250	9,172	925	27,347
1985	Chinook	3,535	2,050	c	5,585
	Sockeye	2,843	2,710	c	5,553
	Chum	4,415	3,593	c	8,008
1986	Chinook	1,068	1,249	c	2,317
	Sockeye	8,960	16,990	c	25,950
	Chum	11,850	4,400	c	16,250
1987	Chinook	2,234	1,598	38	3,870
	Sockeye	19,786	9,033	0	28,819
	Chum	12,103	2,805	680	15,588
1988	Chinook	637	1,024	c	1,661
	Sockeye	5,880	5,831	c	11,711
	Chum	3,846	5,814	c	9,660
1989	Chinook				
	Sockeye				
	Chum				
Escapement	Chinook	1,600	800	c	2,400
Objectived	Sockeye	15,000	5,000	c	20,000
	Chum	17,000	4,000	c	21,000

-continued-

Appendix D.1. (2 of 2)

- a Includes Goodnews Lake.
- b Includes Middle Fork Lakes
- c Information not available.
- d Escapement objectives are preliminary and are subject to change as additional data becomes available. Escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.

1983 commercial sample sizes					
Male	0.0	14.4	7.8	22.3	1.1
Female	0.0	0.2	0.6	46.8	2.0
Combined	0.0	14.6	8.2	74.1	3.1
Commercial	0	2,461	1,128	10,461	438
Escapement	0	0	0	0	0
1983 escapement sample sizes					
Male	0.0	0.0	0.0	39.2	2.9
Female	0.0	0.0	0.0	44.6	1.4
Combined	0.0	0.0	0.0	84.1	4.3
Escapement	0	0	0	0	0
1984 commercial sample sizes					
Male	0.2	7.8	12.4	22.4	2.4
Female	0.0	0.0	0.0	22.0	7.2
Combined	0.2	7.8	12.4	44.4	12.6
Commercial	12	422	3,031	3,824	1,082
Escapement	0	0	0	0	0
1984 escapement sample sizes					
Male	0.0	0.0	0.0	22.4	2.4
Female	0.0	0.0	0.0	22.0	7.2
Combined	0.0	0.0	0.0	44.4	12.6
Escapement	0	0	0	0	0

Appendix D.2. Historical age composition percentage, chinook salmon,
Goodnews Bay commercial harvest and escapement,
1982 - 1989.

Age composition	Total years of life at maturity ^a					Total
	3	4	5	6	7+	
1982 commercial sample size:	107					
Male	0.0	5.6	37.4	11.2	0.0	54.2
Female	0.0	2.8	29.9	13.1	0.0	45.8
Combined	0.0	8.4	67.3	24.3	0.0	100.0
Commercial Harvest ^b	0	796	6,377	2,303	0	9,476

1982 no escapement samples were collected.

1983 commercial sample size:	655					
Male	0.0	14.4	7.6	25.3	1.1	48.4
Female	0.0	0.2	0.6	48.8	2.0	51.6
Combined	0.0	14.6	8.2	74.1	3.1	100.0
Commercial Harvest ^b	0	2,061	1,158	10,461	438	14,117

1983 escapement sample size: 139

Carcass samples.

Male	0.0	0.0	9.4	39.5	2.9	51.8
Female	0.0	0.0	2.2	44.6	1.4	48.2
Combined	0.0	0.0	11.6	84.1	4.3	100.0
Estimated Escapement ^c	0	0	1,670	12,109	619	14,398

1984 commercial sample size: 500

Male	0.2	7.6	32.4	22.4	5.4	68.0
Female	0.0	0.0	2.8	22.0	7.2	32.0
Combined	0.2	7.6	35.2	44.4	12.6	100.0
Commercial Harvest ^b	17	655	3,031	3,824	1,085	8,612

1984 escapement sample size: 111

Carcass samples.

Male	0.0	4.5	22.6	20.7	3.6	51.4
Female	0.0	0.0	4.5	39.6	4.5	48.6
Combined	0.0	4.5	27.1	60.3	0.0	100.0
Estimated Escapement ^c	0	393	2,369	5,272	0	8,743

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Age composition	Total years of life at maturity ^a					Total
	3	4	5	6	7+	
1985 commercial sample size: 532						
Male	0.2	18.2	7.5	30.8	2.4	59.1
Female	0.0	10.0	4.5	25.2	1.1	40.9
Combined	0.2	28.2	12.0	56.0	3.6	100.0
Commercial Harvest ^b	12	1,634	695	3,244	208	5,793
1985 escapement sample size: 19						
Carcass samples.						
Male	0.0	0.0	0.0	21.0	5.3	59.1
Female	0.0	0.0	0.0	73.7	0.0	40.9
Combined	0.0	0.0	0.0	94.7	5.3	100.0
Estimated Escapement ^c	0	0	0	7,556	423	7,979
1986 commercial sample size: 363						
Male	0.0	17.0	49.0	16.0	4.0	86.0
Female	0.0	0.0	2.0	19.0	8.0	29.0
Combined	0.0	17.0	51.0	35.0	12.0	115.0
Commercial Harvest ^b	0	463	1,389	953	327	2,723
1986 escapement sample size: 1						
Beach seine sample.						
Male	0.0	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	100.0	0.0	100.0
Combined	0.0	0.0	0.0	100.0	0.0	100.0
Estimated Escapement ^c	0	0	0	4,094	0	4,094
1987 commercial sample size: ___ ^d						
Male						0.0
Female						0.0
Combined						0.0
Commercial Harvest ^b	0	0	0	0	0	
1987 escapement sample size 39 ^d						
Beach seine sample.						
Male	0.1	0.1	0.3	0.0	0.5	0.9
Female	0.1	0.2	0.2	0.1	0.5	1.1
Combined	0.2	0.3	0.5	0.1	1.0	2.0
Estimated Escapement ^c	806	1,151	2,187	345	4,490	

-continued-

- a Total years of life at maturity are represented by the follow Eropean salmon age designations. European age designate the number of fresh water and marine annuli, respectively. Age composition 3 includes 1.1 and small numbers of 0.2.
Age composition 4 includes 1.2 and small numbers of 0.3.
Age composition 5 includes 1.3 and small numbers of 0.4.
Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.
Age composition 7+ includes age compositions 1.5 and 2.4.
- b Allocations by age class based on that years commercial catch sample results.
- c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Goodnews River salmon counting tower project.
- d Preliminary data.

1986 commercial sample size					
Male	0.0	17.0	49.0	1.0	86.0
Female	0.0	0.0	8.0	19.0	29.0
Combined	0.0	17.0	57.0	29.0	117.0
Commercial	0	463	1,389	321	2,723
1986 escapement sample size					
Male	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	100.0	100.0
Combined	0.0	0.0	0.0	100.0	100.0
Escapement	0	0	0	4,094	4,094
1987 commercial sample size					
Male	0	0	0	0	0.0
Female	0	0	0	0	0.0
Combined	0	0	0	0	0.0
1987 escapement sample size					
Male	0.1	0.1	0.3	0.0	0.8
Female	0.2	0.2	0.2	0.1	1.1
Combined	0.2	0.3	0.7	0.1	2.0
Escapement	806	1,171	5,187	143	4,490

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Appendix D.3. Historical estimated run size and commercial exploitation rate, Goodnews River, 1981-1989.

Year	Species	Middle Fork Tower Estimate	Middle Fork Aerial Survey Count as a Percentage of Tower Estimate	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Goodnews Bay Total Run Size Estimate	Exploitation ^a Percentage of Run Size
1981 ^b	Chinook	3,688	-	-	1,409	7,190	-	-
	Sockeye	49,108	-	-	3,511 ^c	40,273	-	-
	Chum	21,827	-	-	-	13,642	-	-
1982 ^b	Chinook	1,395	-	-	1,236	9,476	-	-
	Sockeye	56,255	-	-	2,754 ^c	38,877	-	-
	Chum	6,767	-	-	-	13,829	-	-
1983	Chinook	6,027	36%	14,398	1,066	14,117	29,581	51%
	Sockeye	25,816	22%	69,955	1,518 ^c	11,716	83,189	16%
	Chum	15,548	-	-	-	6,766	-	-
1984	Chinook	3,260	35%	8,743	629	8,612	17,984	51%
	Sockeye	32,053	27%	67,213	964	15,474	83,651	20%
	Chum	19,003	35%	117,739	189	14,340	132,268	11%
1985	Chinook	2,831	70%	7,979	426	5,793	14,198	44%
	Sockeye	24,131	11%	50,481	704	6,698	57,883	13%
	Chum	10,367	32%	25,025	348	4,784	30,157	17%
1986	Chinook	2,083	57%	4,094	555	2,723	7,372	44%
	Sockeye	51,069	28%	93,228	942	22,608	116,778	20%
	Chum	14,765	38%	51,910	191	10,355	62,456	17%
1987	Chinook	2,274	100%	4,490	816	3,357	8,663	48%
	Sockeye	28,871	85%	51,989	955	27,758	80,702	36%
	Chum	17,519	58%	37,802	578	20,381	58,761	36%
1988	Chinook	2,712	39%	5,419	310	4,964	10,693	49%
	Sockeye	15,799	30%	38,319	1,065	36,368	75,752	49%
	Chum	20,799	21%	39,501	448	33,059	73,008	46%
1989 ^d	Chinook	1,915	67%	2,891	467	2,966	6,324	54%
	Sockeye	21,186	60%	35,476	869	19,299	55,644	36%
	Chum	10,380	28%	15,495	760	13,622	29,877	48%

a Commercial and subsistence exploitation

b Incomplete aerial survey results.

c Subsistence caught chum salmon is included in subsistence sockeye salmon harvest.

d Preliminary figures.

Appendix D.4. Historical age composition percentage, sockeye salmon, Goodnews Bay commercial harvest and escapement, 1982 - 1989.

Age composition	Total years of life at maturity ^a				Total
	3	4	5	6	
1982 commercial sample size:	102				
Male	0.0	3.9	43.1	10.8	57.8
Female	0.0	1.0	36.3	4.9	42.2
Combined	0.0	4.9	79.4	15.7	100.0
Commercial Harvest ^b	0	1,905	30,868	6,104	38,877
1982 no escapement sockeye salmon samples were collected.					
1983 commercial sample size:	404				
Male	0.0	19.0	31.3	4.2	54.5
Female	0.0	20.0	22.3	3.2	45.5
Combined	0.0	39.0	53.6	7.4	100.0
Commercial Harvest ^b	0	4,569	6,280	867	11,716
1983 escapement sample size:	18				
Carcass samples only.					
Male	0.0	72.2	11.1	0.0	83.3
Female	0.0	5.6	11.1	0.0	16.7
Combined	0.0	77.8	22.2	0.0	100.0
Estimated Escapement ^c	0	54,425	15,530	0	69,955
1984 commercial sample size:	549				
Male	0.0	14.8	45.1	2.2	62.1
Female	0.0	6.2	31.0	0.7	37.9
Combined	21.0	97.1	79.0	2.9	100.0
Commercial Harvest ^b	3,250	15,025	12,224	449	15,474
1984 escapement sample size:	47				
Carcass samples only.					
Male	0.0	23.4	27.7	0.0	51.1
Female	0.0	21.3	27.6	0.0	48.9
Combined	0.0	44.7	55.3	0.0	100.0
Estimated Escapement ^c	0	30,044	37,169	0	67,213

- Continued -

	Total years of life at maturity ^a				
Age composition	3	4	5	6	Total
1985 commercial sample size: 488					
Male	0.0	10.7	43.6	0.0	59.1
Female	0.0	13.5	32.2	0.0	40.9
Combined	0.0	24.2	75.8	0.0	100.0
Commercial Harvest ^b	0	1,621	5,077	0	6,698
1985 escapement sample size: 17					
Carcass samples only.					
Male	0.0	17.7	47.0	0.0	64.7
Female	0.0	29.4	5.9	0.0	35.3
Combined	0.0	47.1	52.9	0.0	100.0
Estimated Escapement ^c	0	23,777	26,704	0	50,481
1986 commercial sample size: 488					
Male	0.0	5.1	49.8	0.0	54.9
Female	0.0	3.5	41.6	0.0	45.1
Combined	0.0	8.5	91.5	0.0	100.0
Commercial Harvest ^b	0	2,146	22,966	0	25,112
1986 escapement sample size: 91					
Beach seine samples only.					
Male	0.0	5.5	54.9	0.0	60.4
Female	1.1	2.2	36.3	0.0	39.6
Combined	1.1	7.7	91.2	0.0	100.0
Estimated Escapement ^c	1,026	7,179	85,024	0	93,228
1987 commercial sample size: 577 ^d					
Male	0.0	4.0	45.5	0.0	49.5
Female	0.0	2.9	47.6	0.0	50.5
Combined	0.0	6.9	93.1	0.0	100.0
Commercial Harvest ^b	0	1,915	25,843	0	27,758
1987 escapement sample size: 545 ^d					
Beach seine samples only.					
Male	0.0	4.0	46.6	2.4	53.0
Female	0.0	6.1	39.3	1.6	47.0
Combined	0.0	10.1	85.9	4.0	100.0
Estimated Escapement ^c	0	5,352	45,517	2,120	52,989

-continued-

	<u>Total years of life at maturity^a</u>					
<u>Age composition</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>Total</u>
1988 commercial sample size: 735 ^d						
Male	0.1	3.5	51.8	3.0	0.1	58.5
Female	0.0	0.7	37.9	2.9	0.0	41.5
Combined	0.1	4.2	89.7	5.9	0.1	100.0
Commercial Harvest ^b	36	1,527	32,623	2,146	36	36,368
1988 escapement sample size: 314 ^d						
Beach seine samples only.						
Male	0.0	5.1	36.0	1.0	0.0	42.1
Female	0.0	8.0	48.0	1.9	0.0	57.9
Combined	0.0	13.1	84.0	2.9	0.0	100.0
Estimated Escapement ^c	Kim, need escapement estimate here!!					

- a The total years of life at maturity are represented by the following European salmon age designations. European age designate the number of fresh water and marine annuli, respectively. Age composition 3 includes 1.1 and small numbers of 0.2. Age composition 4 includes 1.2 and small numbers of 0.3 and 2.1. Age composition 5 includes 1.3 and small numbers of 0.4 and 2.2. Age composition 6 includes 1.4 and small numbers of 0.5 and 2.3. Age composition 7 includes age compositions 1.5 and 2.4.
- b Allocations by age class based on commercial catch sample results.
- c Allocations by age class based on escapement sample results. Escapement estimate based on the Goodnews River salmon counting tower project.
- d Preliminary data.

Appendix D.5. Goodnews Bay District commercial salmon harvest,
1968 - 1989.

YEAR	CHINOOK	SOCKEYE	COHO	PINK	CHUM	TOTAL
1968			5,458			5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
1989	2,966	19,299	31,849	82	13,622	67,818
Five year Average (1984-1988)	5,089	22,282	33,388	2,946	16,584	80,289

Appendix D.6. Average cumulative estimated escapement and proportion by day for chinook, sockeye and chum salmon, Goodnews River counting tower, 1981 - 1989.*

Date	Chinook		Sockeye		Chum	
	Ave. Cumulative Number	Percent	Ave. Cumulative Number	Percent	Ave. Cumulative Number	Percent
6/11	0	0.00010	0	0.00001	0	0.00000
6/12	0	0.00010	0	0.00001	0	0.00000
6/13	0	0.00010	0	0.00001	0	0.00000
6/14	0	0.00000	1	0.00002	0	0.00000
6/15	0	0.00000	12	0.00038	0	0.00000
6/16	0	0.00000	13	0.00042	0	0.00001
6/17	1	0.00043	17	0.00055	0	0.00001
6/18	1	0.00043	28	0.00087	0	0.00001
6/19	3	0.00107	66	0.00209	0	0.00001
6/20	5	0.00164	87	0.00276	0	0.00003
6/21	8	0.00280	189	0.00597	1	0.00005
6/22	14	0.00481	323	0.01019	3	0.00023
6/23	35	0.01175	666	0.02104	5	0.00031
6/24	57	0.01889	1270	0.04013	20	0.00133
6/25	100	0.03333	2199	0.06946	91	0.00597
6/26	132	0.04378	3072	0.09705	167	0.01094
6/27	186	0.06171	4140	0.13080	300	0.01961
6/28	229	0.07604	4984	0.15745	364	0.02380
6/29	289	0.09578	5875	0.18562	443	0.02898
6/30	369	0.12252	6784	0.21433	571	0.03737
7/1	470	0.15599	7962	0.25154	822	0.05378
7/2	556	0.18456	9177	0.28995	1021	0.06684
7/3	623	0.20664	10261	0.32417	1243	0.08139
7/4	700	0.23248	11714	0.37007	1500	0.09817
7/5	805	0.26712	13564	0.42854	1771	0.11592
7/6	906	0.30072	15194	0.48001	2073	0.13569
7/7	1035	0.34366	16747	0.52909	2398	0.15699
7/8	1131	0.37527	18405	0.58147	2715	0.17773
7/9	1233	0.40939	20219	0.63877	3277	0.21453
7/10	1355	0.44983	21676	0.68481	3956	0.25895
7/11	1484	0.49268	23100	0.72981	4647	0.30422
7/12	1608	0.53366	24295	0.76755	5429	0.35540
7/13	1719	0.57052	25342	0.80062	6055	0.39636
7/14	1830	0.60743	26290	0.83057	6713	0.43944
7/15	1951	0.64764	27205	0.85948	7460	0.48832
7/16	2058	0.68323	28012	0.88499	8290	0.54271
7/17	2173	0.72140	28625	0.90435	9060	0.59309
7/18	2275	0.75510	29210	0.92283	9613	0.62928
7/19	2356	0.78206	29711	0.93867	10090	0.66054
7/20	2443	0.81099	30185	0.95364	10650	0.69717
7/21	2523	0.83736	30553	0.96526	11206	0.73356
7/22	2608	0.86563	30869	0.97524	11850	0.77573
7/23	2684	0.89081	31063	0.98138	12465	0.81601
7/24	2750	0.91287	31215	0.98620	12968	0.84891

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Date	Chinook		Sockeye		Chum	
	Ave. Number	Cumulative Percent	Ave. Number	Cumulative Percent	Ave. Number	Cumulative Percent
7/25	2804	0.93071	31336	0.98999	13446	0.88023
7/26	2854	0.94732	31418	0.99259	13886	0.90902
7/27	2879	0.95580	31475	0.99438	14215	0.93052
7/28	2911	0.96616	31531	0.99616	14633	0.95788
7/29	2938	0.97527	31567	0.99730	14854	0.97234
7/30	2963	0.98373	31598	0.99827	14999	0.98187
7/31	2978	0.98859	31609	0.99862	15106	0.98888
8/1	2986	0.99123	31621	0.99901	15143	0.99127
8/2	2992	0.99324	31634	0.99941	15184	0.99400
8/3	3000	0.99580	31643	0.99971	15233	0.99717
8/4	3004	0.99702	31648	0.99985	15241	0.99771
8/5	3007	0.99824	31651	0.99995	15250	0.99832
8/6	3009	0.99892	31651	0.99997	15256	0.99870
8/7	3011	0.99936	31651	0.99997	15259	0.99887
8/8	3012	0.99976	31652	0.99999	15262	0.99906
8/9	3013	1.00000	31652	0.99999	15265	0.99928
8/10	3013	1.00000	31652	0.99999	15267	0.99938
8/11	3013	1.00000	31653	1.00002	15269	0.99954
8/12	3013	1.00000	31653	1.00001	15271	0.99966
8/13	3013	1.00000	31653	1.00001	15272	0.99976
8/14	3013	1.00000	31652	1.00000	15273	0.99981
8/15	3013	1.00000	31652	1.00000	15276	1.00000

- a Average for the years 1981-1985, 1987-1989. Early termination date of project in 1986 precluded assesment of the entire chinook, sockeye and chum salmon migration. The project's normal termination date precludes adequate assesment of coho and pink salmon escapement.

Appendix D.7. Historical age composition percentage, chum salmon,
Goodnews Bay commercial harvest and escapement,
1982 - 1989.

Age composition	Total years of life at maturity ^a				Total
	3	4	5	6	
1982 commercial sample size:	135				
Male	0.0	16.3	20.0	0.0	36.3
Female	0.7	29.6	32.7	0.7	63.7
Combined	0.7	45.9	52.7	0.7	100.0
Commercial Harvest ^b	97	6,348	7,288	97	13,829
1982 no escapement chum salmon samples were collected.					
1983 commercial sample size:	216				
Male	0.9	15.3	22.7	0.5	39.4
Female	2.8	27.3	30.5	0.0	60.6
Combined	3.7	42.6	53.2	0.5	100.0
Commercial Harvest ^b	250	2,882	3,600	34	6,766
1983 escapement sample size:	174				
Carcass samples only.					
Male	0.6	19.0	37.3	0.0	56.9
Female	0.6	15.5	27.0	0.0	43.1
Combined	1.2	34.5	64.3	0.0	100.0
Estimated Escapement ^c					
1984 commercial sample size:	457				
Male	0.0	30.6	15.3	2.0	47.9
Female	0.4	38.5	12.5	0.7	52.1
Combined	69.5	96.9	30.5	2.7	100.0
Commercial Harvest ^b	9,966	13,895	4,374	387	14,340
1984 escapement sample size:	90				
Carcass samples only.					
Male	0.0	32.3	4.4	0.0	36.7
Female	0.0	56.6	6.7	0.0	63.3
Combined	0.0	88.9	11.1	0.0	100.0
Estimated Escapement ^c	0	104,670	13,069	0	117,739

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	Total years of life at maturity ^a				
Age composition	3	4	5	6	Total
1985 commercial sample size: 270					
Male	0.0	27.8	14.4	0.0	59.1
Female	0.0	30.0	27.5	0.0	40.9
Combined	0.0	57.8	41.9	0.0	100.0
Commercial Harvest ^b	0	2,765	2,004	0	4,784
1985 escapement sample size: 46					
Carcass samples only.					
Male	0.0	30.4	19.6	0.0	50.0
Female	0.0	28.3	21.7	0.0	50.0
Combined	0.0	58.7	41.3	0.0	100.0
Estimated Escapement ^c	0	14,690	10,335	0	25,025
1986 commercial sample size: 353 ^c					
Male	0.2	37.7	12.2	0.2	50.3
Female	0.5	36.0	12.5	0.7	49.7
Combined	0.7	73.7	24.7	0.9	100.0
Commercial Harvest ^b	72	7,632	2,558	93	10,355
1986 escapement sample size: 21 ^d					
Beach seine samples only.					
Male	0.0	38.0	19.0	0.0	57.0
Female	0.0	33.0	10.0	0.0	43.0
Combined	0.0	71.0	29.0	0.0	100.0
Estimated Escapement ^c	0	36,856	15,054	0	51,910
1987 commercial sample size:					
Male					
Female					
Combined					
Commercial Harvest ^b					
1987 escapement sample size: 467					
Beach seine sample only					
Male	0.0	37.3	30.2	0.0	67.5
Female	0.2	22.3	10.1	0.0	32.5
Combined	0.2	59.5	40.3	0.0	100.0
Estimated Escapement ^c	81	22,503	15,218	0	37,802

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- a The total years of life at maturity are represented by the following European salmon age designations. European age designate the number of fresh water and marine annuli, respectively.
 Age composition 3 includes 1.1 and small numbers of 0.2.
 Age composition 4 includes 1.2 and small numbers of 0.3.
 Age composition 5 includes 1.3 and small numbers of 0.4.
 Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.
 Age composition 7+ includes age compositions 1.5 and 2.4.
- b Allocations by age class based on that years commercial catch sample results.
- c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Goodnews River salmon counting tower project.
- d Preliminary data.

1985 escapement sample size: 45				
Escapement	0	14,800	10,332	0
Estimated	0	14,800	10,332	0
Combined	0.0	58.7	61.3	0.0
Female	0.0	58.7	61.3	0.0
Male	0.0	58.7	61.3	0.0
1985 commercial sample size: 45				
Harvest	73	7,402	7,458	93
Commercial	73	7,402	7,458	93
Combined	0.0	73.7	74.7	0.0
Female	0.0	73.7	74.7	0.0
Male	0.0	73.7	74.7	0.0
1986 escapement sample size: 214				
Escapement	0	36,826	12,024	0
Estimated	0	36,826	12,024	0
Combined	0.0	71.0	29.0	0.0
Female	0.0	71.0	29.0	0.0
Male	0.0	71.0	29.0	0.0
1986 commercial sample size: 214				
Harvest	73	7,402	7,458	93
Commercial	73	7,402	7,458	93
Combined	0.0	73.7	74.7	0.0
Female	0.0	73.7	74.7	0.0
Male	0.0	73.7	74.7	0.0
1987 escapement sample size: 467				
Escapement	81	52,303	12,218	0
Estimated	81	52,303	12,218	0
Combined	0.0	59.5	40.3	0.0
Female	0.0	59.5	40.3	0.0
Male	0.0	59.5	40.3	0.0
1987 commercial sample size: 467				
Harvest	81	52,303	12,218	0
Commercial	81	52,303	12,218	0
Combined	0.0	59.5	40.3	0.0
Female	0.0	59.5	40.3	0.0
Male	0.0	59.5	40.3	0.0

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Appendix D.8. Summary of historical commercial harvest by period,
Goodnews Bay District, chinook salmon, 1981-1989.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
6/12	0	0	0	0	0.00000
6/13	1	1252	1252	1252	0.00985
6/14	0	0	0	0	0.00985
6/15	1	197	197	197	0.01290
6/16	2	251	1096	674	0.02714
6/17	1	362	362	362	0.03139
6/18	3	387	1706	1084	0.08410
6/19	2	296	390	343	0.11079
6/20	3	404	2642	1231	0.15306
6/21	2	1298	1535	1417	0.18780
6/22	1	1591	1591	1591	0.21239
6/23	3	583	1639	1003	0.30307
6/24	3	476	988	695	0.34504
6/25	2	1621	1896	1759	0.39456
6/26	2	352	416	384	0.42450
6/27	2	1627	3944	2786	0.48675
6/28	3	807	1307	1024	0.53766
6/29	1	457	457	457	0.54473
6/30	3	460	1551	979	0.61083
7/1	1	1156	1156	1156	0.63300
7/2	3	234	578	380	0.65078
7/3	2	156	391	274	0.66956
7/4	1	2301	2301	2301	0.68767
7/5	4	95	1809	681	0.72743
7/6	1	272	272	272	0.73163
7/7	5	196	1119	706	0.81092
7/8	3	147	495	277	0.82665
7/9	2	347	351	349	0.83524
7/10	3	156	203	186	0.85228
7/11	4	124	408	262	0.87219
7/12	2	327	737	532	0.88505
7/13	1	135	135	135	0.88714
7/14	5	54	514	231	0.90750
7/15	3	77	354	204	0.91966
7/16	3	66	294	146	0.92736
7/17	1	210	210	210	0.93061
7/18	3	54	217	114	0.93611
7/19	1	66	66	66	0.93688
7/20	3	75	192	137	0.94408
7/21	3	35	68	49	0.94796
7/22	2	80	228	154	0.95099
7/23	3	17	97	46	0.95342
7/24	2	23	77	50	0.95547
7/25	4	0	82	33	0.95806

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Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
7/26	1	0	0	0	0.95806
7/27	4	26	122	74	0.96203
7/28	2	5	21	13	0.96294
7/29	3	31	157	73	0.96538
7/30	3	16	73	36	0.96719
7/31	2	20	34	27	0.96847
8/1	5	12	78	42	0.97154
8/2	7	13	102	45	0.97274
8/3	8	6	102	38	0.97647
8/4	3	6	17	12	0.97749
8/5	4	12	54	27	0.97892
8/6	3	6	79	32	0.98050
8/7	2	15	43	29	0.98172
8/8	5	0	60	19	0.98342
8/9	2	11	18	15	0.98423
8/10	5	10	78	32	0.98626
8/11	3	5	15	10	0.98725
8/12	4	7	47	25	0.98856
8/13	4	0	36	11	0.98935
8/14	3	8	41	20	0.99055
8/15	4	5	26	15	0.99145
8/16	3	0	12	6	0.99191
8/17	5	2	22	12	0.99291
8/18	3	0	8	5	0.99354
8/19	4	5	14	10	0.99430
8/20	3	1	12	6	0.99471
8/21	4	0	7	4	0.99514
8/22	4	3	17	10	0.99573
8/23	3	0	7	4	0.99611
8/24	4	2	17	9	0.99684
8/25	4	0	13	5	0.99714
8/26	4	2	8	5	0.99760
8/27	3	2	13	6	0.99788
8/28	4	1	8	4	0.99835
8/29	4	3	4	4	0.99868
8/30	3	1	4	2	0.99887
8/31	4	1	6	3	0.99912
9/1	4	0	7	2	0.99944
9/2	4	1	5	3	0.99970
9/3	3	0	2	1	0.99973
9/4	3	0	6	2	0.99985
9/5	4	0	5	2	0.99996
9/6	2	0	0	0	0.99996
9/7	4	0	1	0	0.99998
9/8	4	0	2	1	0.99998
9/9	1	0	0	0	0.99998

Appendix D.9. Summary of historical commercial harvest by period,
Goodnews Bay District, sockeye salmon, 1981-1989.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
6/12	0	0	0	0	0.00000
6/13	1	27	27	27	0.00026
6/14	0	0	0	0	0.00026
6/15	1	70	70	70	0.00045
6/16	2	125	696	411	0.00376
6/17	1	744	744	744	0.00592
6/18	3	281	596	408	0.01158
6/19	2	478	551	515	0.01686
6/20	3	102	1989	875	0.02971
6/21	2	967	1280	1124	0.04036
6/22	1	569	569	569	0.04193
6/23	3	1029	2701	1732	0.06318
6/24	3	596	2120	1536	0.08678
6/25	2	1040	2087	1564	0.10464
6/26	2	1719	1909	1814	0.12323
6/27	2	685	952	819	0.14362
6/28	3	2097	3371	2800	0.17741
6/29	1	1422	1422	1422	0.18133
6/30	3	2037	8143	5091	0.23705
7/1	1	1143	1143	1143	0.25601
7/2	3	1818	2657	2194	0.28428
7/3	2	2589	5510	4050	0.32124
7/4	1	1598	1598	1598	0.33640
7/5	4	1254	4221	2715	0.38078
7/6	1	2346	2346	2346	0.38725
7/7	5	2057	4833	3532	0.46935
7/8	3	1231	3600	2320	0.50664
7/9	2	2167	3751	2959	0.53307
7/10	3	1759	4494	3157	0.57195
7/11	4	1397	3826	2473	0.63639
7/12	2	1444	2318	1881	0.65347
7/13	1	2720	2720	2720	0.66098
7/14	5	1039	3173	2277	0.71068
7/15	3	1229	4818	2942	0.75549
7/16	3	902	2841	1675	0.77825
7/17	1	3936	3936	3936	0.78911
7/18	3	559	3049	1802	0.81168
7/19	1	1683	1683	1683	0.81656
7/20	3	395	3852	1975	0.83674
7/21	3	507	1318	904	0.84915
7/22	2	614	2207	1411	0.86106
7/23	3	162	874	451	0.86768
7/24	2	588	2458	1523	0.87785
7/25	4	0	1534	550	0.88586

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Appendix D.9. (page 2 of 2)

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
7/26	1	0	0	0	0.88586
7/27	4	166	1270	553	0.89635
7/28	2	278	555	417	0.89961
7/29	3	630	1312	1045	0.91288
7/30	3	84	344	257	0.91600
7/31	2	300	803	552	0.91994
8/1	5	45	811	338	0.93050
8/2	7	36	949	454	0.93295
8/3	8	36	949	397	0.94387
8/4	3	188	208	195	0.94645
8/5	4	94	932	440	0.95415
8/6	3	34	251	153	0.95590
8/7	2	178	686	432	0.95882
8/8	5	0	926	245	0.96313
8/9	2	46	135	91	0.96404
8/10	5	18	659	339	0.97046
8/11	3	0	174	85	0.97169
8/12	4	17	564	238	0.97560
8/13	4	0	204	86	0.97706
8/14	3	4	316	147	0.97870
8/15	4	5	398	137	0.98076
8/16	3	0	110	38	0.98148
8/17	5	4	498	179	0.98439
8/18	3	0	120	72	0.98547
8/19	4	5	360	125	0.98737
8/20	3	0	138	47	0.98800
8/21	4	1	239	104	0.98998
8/22	4	7	353	120	0.99172
8/23	3	0	88	31	0.99230
8/24	4	1	244	90	0.99344
8/25	4	0	90	37	0.99434
8/26	4	0	204	88	0.99548
8/27	3	0	28	9	0.99560
8/28	4	1	79	48	0.99646
8/29	4	1	155	45	0.99709
8/30	3	0	68	24	0.99755
8/31	4	0	88	44	0.99815
9/1	4	0	57	26	0.99871
9/2	4	2	69	41	0.99929
9/3	3	0	21	7	0.99939
9/4	3	0	53	18	0.99962
9/5	4	0	61	15	0.99980
9/6	2	0	0	0	0.99980
9/7	4	0	63	16	1.00000
9/8	4	0	0	0	1.00000
9/9	1	0	0	0	1.00000

Appendix D.10. Summary of historical commercial harvest by period, Goodnews Bay District, chum salmon, 1981-1989.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
6/12	0	0	0	0	0.00000
6/13	1	10	10	10	0.00016
6/14	0	0	0	0	0.00016
6/15	1	102	102	102	0.00099
6/16	2	89	1091	590	0.00612
6/17	1	167	167	167	0.00746
6/18	3	194	501	316	0.01431
6/19	2	249	557	403	0.02153
6/20	3	165	3501	1336	0.04272
6/21	2	591	698	645	0.05291
6/22	1	708	708	708	0.05867
6/23	3	886	7833	3202	0.10173
6/24	3	594	1188	868	0.13205
6/25	2	724	2351	1538	0.15616
6/26	2	866	1241	1054	0.17558
6/27	2	691	728	710	0.20357
6/28	3	649	8369	3666	0.25226
6/29	1	425	425	425	0.25573
6/30	3	1349	2048	1675	0.29097
7/1	1	710	710	710	0.30746
7/2	3	713	3434	2012	0.33944
7/3	2	1309	3074	2192	0.36688
7/4	1	1626	1626	1626	0.39356
7/5	4	976	3193	1966	0.44145
7/6	1	963	963	963	0.44930
7/7	5	1357	4478	2336	0.54893
7/8	3	949	1894	1392	0.58819
7/9	2	1191	1371	1281	0.60838
7/10	3	1346	2085	1677	0.65287
7/11	4	562	5830	2165	0.71501
7/12	2	1057	1384	1221	0.73432
7/13	1	1143	1143	1143	0.74362
7/14	5	601	2123	1340	0.80067
7/15	3	767	2495	1735	0.84940
7/16	3	476	1360	1017	0.87723
7/17	1	1532	1532	1532	0.88971
7/18	3	488	1191	776	0.91268
7/19	1	506	506	506	0.91674
7/20	3	657	1265	951	0.93632
7/21	3	233	467	380	0.94679
7/22	2	307	362	335	0.95523
7/23	3	35	301	196	0.96070
7/24	2	244	315	280	0.96526
7/25	4	0	236	167	0.97014

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Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
7/26	1	0	0	0	0.97014
7/27	4	58	166	126	0.97518
7/28	2	89	93	91	0.97688
7/29	3	32	166	90	0.98011
7/30	3	42	120	84	0.98234
7/31	2	8	92	50	0.98315
8/1	5	22	61	47	0.98606
8/2	7	22	105	59	0.98719
8/3	8	22	105	45	0.98936
8/4	3	23	36	29	0.99013
8/5	4	21	63	32	0.99140
8/6	3	22	41	31	0.99220
8/7	2	16	21	19	0.99251
8/8	5	0	26	13	0.99300
8/9	2	19	45	32	0.99352
8/10	5	15	36	23	0.99438
8/11	3	10	25	16	0.99479
8/12	4	0	16	8	0.99511
8/13	4	2	22	12	0.99544
8/14	3	9	62	27	0.99625
8/15	4	0	10	5	0.99642
8/16	3	0	14	6	0.99665
8/17	5	6	22	10	0.99703
8/18	3	0	6	3	0.99711
8/19	4	2	16	7	0.99731
8/20	3	0	7	3	0.99741
8/21	4	0	127	35	0.99853
8/22	4	3	6	5	0.99868
8/23	3	0	16	2	0.99873
8/24	4	0	8	4	0.99880
8/25	4	0	4	2	0.99890
8/26	4	0	42	13	0.99925
8/27	3	0	4	1	0.99928
8/28	4	0	11	4	0.99940
8/29	4	0	16	3	0.99951
8/30	3	0	2	1	0.99955
8/31	4	0	9	4	0.99961
9/1	4	0	4	2	0.99967
9/2	4	0	10	4	0.99981
9/3	3	0	4	2	0.99987
9/4	3	0	9	4	0.99995
9/5	4	0	3	1	0.99998
9/6	2	0	0	0	0.99998
9/7	4	0	2	1	1.00000
9/8	4	0	0	0	1.00000
9/9	1	0	0	0	1.00000

Appendix D.11. Summary of historical commercial harvest by period,
Goodnews Bay, coho salmon, 1979-1989.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion harvest
7/14	1	1	1	1	0.00000
7/15	0	0	0	0	0.00000
7/16	2	2	18	10	0.00004
7/17	0	0	0	0	0.00004
7/18	1	5	5	5	0.00006
7/19	1	6	6	6	0.00007
7/20	2	1	111	56	0.00022
7/21	4	1	18	7	0.00029
7/22	0	0	0	0	0.00029
7/23	3	13	195	79	0.00070
7/24	2	14	33	24	0.00083
7/25	3	24	383	162	0.00176
7/26	1	40	40	40	0.00185
7/27	3	7	1059	378	0.00343
7/28	3	36	153	86	0.00412
7/29	4	5	91	33	0.00451
7/30	3	209	1306	584	0.00762
7/31	4	36	364	122	0.00901
8/1	6	56	2811	603	0.01607
8/2	3	203	1148	747	0.02128
8/3	5	66	3943	883	0.02802
8/4	5	92	949	568	0.03596
8/5	4	126	752	396	0.04247
8/6	5	314	4275	1673	0.05874
8/7	2	231	812	522	0.06213
8/8	6	547	2712	1425	0.08392
8/9	2	2163	2240	2202	0.09445
8/10	6	858	4198	1751	0.11989
8/11	4	663	6065	2618	0.14597
8/12	4	1255	2074	1680	0.17516
8/13	6	1102	4852	2360	0.20623
8/14	3	1325	2374	2018	0.23115
8/15	6	1225	5999	3225	0.27682
8/16	3	1667	5456	3227	0.30393
8/17	6	1390	6880	3487	0.35657
8/18	4	1446	3864	2647	0.38822
8/19	4	1394	4180	2886	0.43075
8/20	5	68	9590	3761	0.46889
8/21	4	968	3459	1965	0.49755
8/22	6	1723	6731	3368	0.55053
8/23	4	1308	5306	3203	0.58366
8/24	5	1597	4356	3101	0.62362
8/25	5	1739	3709	2957	0.66796
8/26	4	1918	3249	2517	0.70661

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Appendix D.11. (page 2 of 2)

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
8/27	5	1101	6625	3315	0.74165
8/28	4	1377	3529	2259	0.77585
8/29	6	725	4972	2460	0.81093
8/30	4	1483	3926	2734	0.84058
8/31	5	1125	3479	2410	0.87239
9/1	5	604	2778	1798	0.89783
9/2	4	653	3233	1541	0.92071
9/3	5	377	3822	2007	0.94147
9/4	3	374	2685	1567	0.96102
9/5	6	0	2695	1447	0.98239
9/6	3	0	1715	956	0.98816
9/7	4	0	1656	690	0.99610
9/8	3	0	843	281	1.00000

APPENDIX F

<p> Clickers reporting both weight and number. Not all clickers reported number, number is estimate based on average weight from fishery. Does not include fishermen who delivered fish incident to the commercial salmon fishery. Does not include catches incident to the commercial salmon fishery. </p>									
Year	Number of Fishermen	Number Caught	Whitelish Burbot	Total Weight (lbs)	Whitelish Burbot	Total Value (\$)	Total		
1980	3	1,184	385	583	510	1,991	1,991		
1981	3	515	0	588	3	1,991	1,991		
1982	3	515	0	588	0	189	189		
1983	3	0	0	0	3,438	0	821		
1984	5	352	1,839	3,515	3,016	1,111	1,297		
1985	0	0	0	0	0	0	0		
1986	0	0	0	0	0	0	0		
1987	0	0	0	0	0	0	0		
1988	0	0	0	0	0	0	0		
1989	0	0	0	0	0	0	0		
1990	0	0	0	0	0	0	0		
1991	0	0	0	0	0	0	0		
1992	0	0	0	0	0	0	0		
1993	0	0	0	0	0	0	0		
1994	0	0	0	0	0	0	0		
1995	0	0	0	0	0	0	0		
1996	0	0	0	0	0	0	0		
1997	0	0	0	0	0	0	0		
1998	0	0	0	0	0	0	0		
1999	0	0	0	0	0	0	0		
2000	0	0	0	0	0	0	0		
2001	0	0	0	0	0	0	0		
2002	0	0	0	0	0	0	0		
2003	0	0	0	0	0	0	0		
2004	0	0	0	0	0	0	0		
2005	0	0	0	0	0	0	0		
2006	0	0	0	0	0	0	0		
2007	0	0	0	0	0	0	0		
2008	0	0	0	0	0	0	0		
2009	0	0	0	0	0	0	0		
2010	0	0	0	0	0	0	0		
2011	0	0	0	0	0	0	0		
2012	0	0	0	0	0	0	0		
2013	0	0	0	0	0	0	0		
2014	0	0	0	0	0	0	0		
2015	0	0	0	0	0	0	0		
2016	0	0	0	0	0	0	0		
2017	0	0	0	0	0	0	0		
2018	0	0	0	0	0	0	0		
2019	0	0	0	0	0	0	0		
2020	0	0	0	0	0	0	0		
2021	0	0	0	0	0	0	0		
2022	0	0	0	0	0	0	0		
2023	0	0	0	0	0	0	0		
2024	0	0	0	0	0	0	0		
2025	0	0	0	0	0	0	0		
2026	0	0	0	0	0	0	0		
2027	0	0	0	0	0	0	0		
2028	0	0	0	0	0	0	0		
2029	0	0	0	0	0	0	0		
2030	0	0	0	0	0	0	0		
2031	0	0	0	0	0	0	0		
2032	0	0	0	0	0	0	0		
2033	0	0	0	0	0	0	0		
2034	0	0	0	0	0	0	0		
2035	0	0	0	0	0	0	0		
2036	0	0	0	0	0	0	0		
2037	0	0	0	0	0	0	0		
2038	0	0	0	0	0	0	0		
2039	0	0	0	0	0	0	0		
2040	0	0	0	0	0	0	0		
2041	0	0	0	0	0	0	0		
2042	0	0	0	0	0	0	0		
2043	0	0	0	0	0	0	0		
2044	0	0	0	0	0	0	0		
2045	0	0	0	0	0	0	0		
2046	0	0	0	0	0	0	0		
2047	0	0	0	0	0	0	0		
2048	0	0	0	0	0	0	0		
2049	0	0	0	0	0	0	0		
2050	0	0	0	0	0	0	0		
2051	0	0	0	0	0	0	0		
2052	0	0	0	0	0	0	0		
2053	0	0	0	0	0	0	0		
2054	0	0	0	0	0	0	0		
2055	0	0	0	0	0	0	0		
2056	0	0	0	0	0	0	0		
2057	0	0	0	0	0	0	0		
2058	0	0	0	0	0	0	0		
2059	0	0	0	0	0	0	0		
2060	0	0	0	0	0	0	0		
2061	0	0	0	0	0	0	0		
2062	0	0	0	0	0	0	0		
2063	0	0	0	0	0	0	0		
2064	0	0	0	0	0	0	0		
2065	0	0	0	0	0	0	0		
2066	0	0	0	0	0	0	0		
2067	0	0	0	0	0	0	0		
2068	0	0	0	0	0	0	0		
2069	0	0	0	0	0	0	0		
2070	0	0	0	0	0	0	0		
2071	0	0	0	0	0	0	0		
2072	0	0	0	0	0	0	0		
2073	0	0	0	0	0	0	0		
2074	0	0	0	0	0	0	0		
2075	0	0	0	0	0	0	0		
2076	0	0	0	0	0	0	0		
2077	0	0	0	0	0	0	0		
2078	0	0	0	0	0	0	0		
2079	0	0	0	0	0	0	0		
2080	0	0	0	0	0	0	0		
2081	0	0	0	0	0	0	0		
2082	0	0	0	0	0	0	0		
2083	0	0	0	0	0	0	0		
2084	0	0	0	0	0	0	0		
2085	0	0	0	0	0	0	0		
2086	0	0	0	0	0	0	0		
2087	0	0	0	0	0	0	0		
2088	0	0	0	0	0	0	0		
2089	0	0	0	0	0	0	0		
2090	0	0	0	0	0	0	0		
2091	0	0	0	0	0	0	0		
2092	0	0	0	0	0	0	0		
2093	0	0	0	0	0	0	0		
2094	0	0	0	0	0	0	0		
2095	0	0	0	0	0	0	0		
2096	0	0	0	0	0	0	0		
2097	0	0	0	0	0	0	0		
2098	0	0	0	0	0	0	0		
2099	0	0	0	0	0	0	0		
2100	0	0	0	0	0	0	0		

Appendix F.1. Commercial freshwater tin fishery catch data, Knapokwim Area, 1977-1999.

Appendix F.1. Commercial freshwater fin fishery catch data, Kuskokwim Area, 1977-1989.

Year	Number of Fishermen ^b	Number Caught ^a		Total Weight (lbs)		Total Value (\$)		
		Whitefish	Burbot	Whitefish	Burbot	Whitefish	Burbot	Total
1977	3	718	0	c	0	952	0	952
1978	b	1,735	0	6,017	0	c	0	c
1979	b	3,219	0	11,211	0	c	0	c
1980	4	603	0	2,173	0	830	0	830
1981	4	1,197	0	4,620	0	2,310	0	2,310
1982	5	1,512	0	6,219	0	2,856	0	2,856
1983	0	0	0	0	0	0	0	0
1984	2	0	651	0	0	0	0	c
1985	5	555	1,829	2,275	2,016	1,137	455	1,593
1986	3	0	0	0	3,428	0	857	857
1987	3	276	0	986	0	789	0	789
1988	3			2,588	7	1,991	3	1,994
1989	7	178 ^d	282	583	270	501	597	1,098

a Does not include catches incidental to the commercial salmon fishery.

b Does not include fisherman who delivered catches incidental to the commercial salmon fishery.

c Data not available.

d Not all tickets reported number, number is estimate based on average weight from tickets reporting both weight and number.

APPENDIX G

a. Tom Cod is the "local" name for Saffron Cod (*Elasmodon aoteanus*).

Year	Fishermen	Number of Tom Cods	Total Weight (lbs)	Total Value (\$)
1988	3		291	1,180
1989	4		439	878

Appendix G.1. Commercial miscellaneous saltwater finfish fishery catch data, Kuskokwim Area, 1988-1989.

Appendix G.1. Commercial miscellaneous saltwater finfish fishery catch data, Kuskokwim Area, 1988-1989.

<u>Year</u>	<u>Number of Fishermen^b</u>	<u>Number Caught Tom Cod^a</u>	<u>Total Weight (lbs)</u>	<u>Total Value (\$)</u>
1988	4		439	878
1989	2		591	1,180

a Tom Cod is the "local" name for Saffron Cod (Eleginus gracilis).

Appendix H.1. Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981-1989.

	Estimated Biomass	Harvest					Estimated Value	Exploitation Rate
District	(st)	Sac-roe	Bait	Waste	Total	Roe%	(\$ X 1000)	(%)
1989								
Security Cove	2830	544	10	0	554	9.4	256	19.6
Goodnews Bay	4044	453	162	0	615	8.4	335	15.2
Cape Avinof	2780	90	39	0	129	8.0	54	4.6
Nelson Is.	3316	122	100	11	233	8.5	57	7.0
Nunivak Is.	617	79	37	0	116	9.4	42	18.8
Total	13587	1288	347	11	1635	8.8	744	14.2
1988								
Security Cove	4906	324	0	0	324	9.3	362	6.6
Goodnews Bay	4479	473	10	0	483	8.0	463	10.8
Cape Avinof	4108	348	0	0	348	8.6	264	8.5
Nelson Is.	7152	760	15	0	775	9.2	713	10.8
Nunivak Is.	2800	-	-	-	-	-	-	-
Total	23445	1905	25	0	1930	8.8	1802	8.2
1987								
Security Cove	2300	312	1	0	313	9.7	242	13.6
Goodnews Bay	2000	179	142	0	321	7.3	133	16.1
Nelson Is.	8100	915	8	0	923	9.2	661	11.4
Nunivak Is.	4400	254	160	0	414	7.8	231	9.4
Total	16800	1660	311	0	1971	8.7	1267	11.7
1986								
Security Cove	3700	747	4	0	751	11.2	535	20.3
Goodnews Bay	3000	554	3	0	557	10.4	325	18.6
Nelson Is.	7300	852	34	0	886	10.3	428	12.1
Nunivak Is.	6000	469	42	0	511	10.1	213	8.5
Total	20000	2622	83	0	2705	10.5	1501	13.5
1985								
Security Cove	4900	703	0	30	733	10.1	355	15.0
Goodnews Bay	4300	711	0	13	724	8.7	309	16.8
Nelson Is.	9500	967	10	0	977	10.6	527	10.3
Nunivak Is.	5700	349	9	0	358	8.9	146	6.3
Total	24400	2730	19	43	2792	9.8	1337	11.4
1984								
Security Cove	5100	325	0	10	335	11.8	110	6.6
Goodnews Bay	4100	667	0	50	717	10.1	168	17.5
Total	9200	992	0	60	1052	10.6	278	11.4
1983								
Security Cove	6400	966	107	0	1073	9.4	443	16.8
Goodnews Bay	3200	426	9	0	435	9.4	185	13.6
Total	9600	1392	116	0	1508	9.4	628	15.7
1982								
Security Cove	5100	707	106	0	813	9.3	271	15.9
Goodnews Bay	2600	437	49	0	486	9.5	188	18.7
Total	7700	1144	155	0	1299	9.4	459	16.9
1981								
Security Cove	8300	1150	23	0	1173	8.1	347	14.1
Goodnews Bay	4300	558	99	0	657	7.7	196	15.3
Total	12600	1708	122	0	1830	8.0	543	14.5

Appendix B.2. Pacific herring subsistence harvest (st) and effort data from selected Kuskokwim Area, Alaska, 1975-1989^a.

Village	Year														
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<u>Nelson Island</u>															
Tununak	22	15	57	38	34	65	40	48	94	e	43	63	48	49	47
Umkumiut	33	9	3	11	8	3	10	0	e	e	e	e	d	d	d
Toksook Bay	34	35	21	37	51	29	14	35	-	-	46	70	51	59	52
Nightmute	-	-	-	-	-	-	-	-	-	-	3 ^b	21	15	16	15
Newtok	-	-	-	-	-	-	-	-	-	-	7 ^b	13	10	12	10
Total	89	59	81	86	93	97	64	83	94	-	99	167	124	136	124
No. of Fishing Families	109	42	90	83	54	70	93	65	43	-	65 ^b	72 ^b	96	104	- ^b
<u>Nunivak Island</u>															
Mekoryuk	-	-	-	-	-	-	-	-	-	-	<1	<1	-	e	e
No. of Fishing Families	-	-	-	-	-	-	-	-	-	-	11	6 ^b	-	e	e
<u>Other Kuskokwim Delta</u>															
Cheforak	-	-	-	-	-	-	-	-	-	-	13 ^b	c	14	e	e
Kipnuk	-	-	-	-	-	-	-	-	-	-	9	c	14	c	e
Kongiganak	-	-	-	-	-	-	-	-	-	-	3	2	c	e	e
Kwigillingok	-	11	1	-	8	13	-	13	-	-	5	c	c	e	e
Total	-	11	1	-	8	13	-	13	-	-	30	2	28	e	e
No. of Fishing Families	-	8	9	-	22	19	-	21	-	-	55 ^b	12 ^b	49	e	e
<u>All Areas Combined</u>															
Total Catch	92	75	85	91	112	121	78	107	103	11	138	177	155	136	124
No. of Fishing Families	143	91	129	112	160	150	139	89	80	47	175 ^b	131	184	104	- ^b

a Subsistence survey results are believed to accurately reflect harvest trends, however, reported catches reflect minimum figures since all fishermen cannot be contacted.

b Fishing families were not interviewed or only a portion of fishing families were interviewed as catch was enumerated while on drying racks.

c Survey not allowed by village council.

d Umkumiut effort included with Toksook Bay and Nightmute.

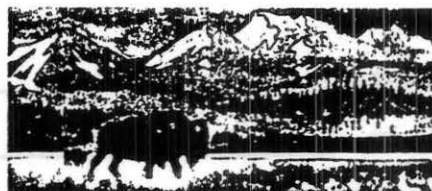
e Not surveyed.

Appendix 1

Dear Boxholder,

Each year the Alaska Department of Fish and Game mails subsistence catch calendars to households that we think fish for salmon for subsistence use. This postcard was mailed to you in an effort to update our list. If you think that someone in your household will fish for subsistence this year, please fill out the back side of the bottom card and drop it in the mail. Thank you.

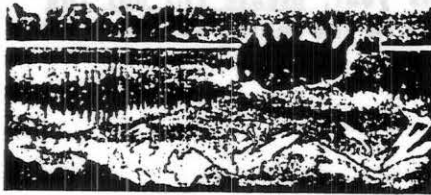
Division of Subsistence
Alaska Dept. of Fish and Game
P.O. Box 1788
Bethel, Alaska 99559



America the Beautiful USA 15

DIVISION OF SUBSISTENCE
ALASKA DEPT. OF FISH AND GAME
P.O. BOX 1788
BETHEL, ALASKA 99559

USA 15 America the Beautiful



Address

Box holder Name

Division of Subsistence
Alaska Dept. of Fish and Game
P.O. Box 1788
Bethel, Alaska 99559

Name: _____

P.O. Box _____

City, State, Zipcode _____

Phone Number _____

(please check one of the following)

_____ Yes, I plan to catch salmon for subsistence use this year.

_____ No, I do not plan to harvest salmon for subsistence use this year.

Appendix 2

NAME _____
LOWER + MIDDLE Kuskokwim
(salmon)


of Fish and Game in Bethel.

PLEASE WRITE THE NUMBER OF ALL SALMON CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR HOUSE. PLEASE INCLUDE SALMON THAT WERE GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES AND SALMON THAT WERE CAUGHT FOR DOGFOOD.

DO NOT INCLUDE SALMON SOLD WHEN COMMERCIAL FISHING.

JUNE 1989

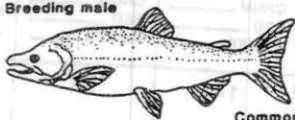
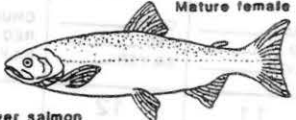
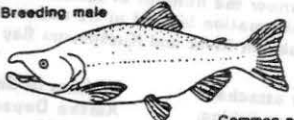
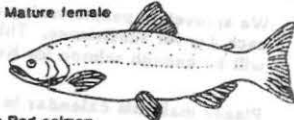
SUBSISTENCE SALMON CALENDAR

WHAT DATE DID YOU START SUBSISTENCE SALMON FISHING THIS YEAR? _____ PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN MAY. KING _____ CHUM _____ RED _____				THURSDAY	FRIDAY	SATURDAY
				1 KING _____ CHUM _____ RED _____	2 KING _____ CHUM _____ RED _____	3 KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY			
4 KING _____ CHUM _____ RED _____	5 KING _____ CHUM _____ RED _____	6 KING _____ CHUM _____ RED _____	7 KING _____ CHUM _____ RED _____	8 KING _____ CHUM _____ RED _____	9 KING _____ CHUM _____ RED _____	10 KING _____ CHUM _____ RED _____
11 KING _____ CHUM _____ RED _____	12 KING _____ CHUM _____ RED _____	13 KING _____ CHUM _____ RED _____	14 KING _____ CHUM _____ RED _____	15 KING _____ CHUM _____ RED _____	16 KING _____ CHUM _____ RED _____	17 KING _____ CHUM _____ RED _____
18 KING _____ CHUM _____ RED _____	19 KING _____ CHUM _____ RED _____	20 KING _____ CHUM _____ RED _____	21 KING _____ CHUM _____ RED _____	22 KING _____ CHUM _____ RED _____	23 KING _____ CHUM _____ RED _____	24 KING _____ CHUM _____ RED _____
25 KING _____ CHUM _____ RED _____	26 KING _____ CHUM _____ RED _____	27 KING _____ CHUM _____ RED _____	28 KING _____ CHUM _____ RED _____	29 KING _____ CHUM _____ RED _____	30 KING _____ CHUM _____ RED _____	

TARYAOVAK =
IQALLUK =
SAYAK =

JULY 1989

SUBSISTENCE SALMON CALENDAR

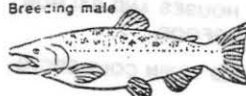

  Common name: Silver salmon						SATURDAY
						1 KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
2 KING _____ CHUM _____ RED _____	3 KING _____ CHUM _____ RED _____	4 KING _____ CHUM _____ RED _____	5 KING _____ CHUM _____ RED _____	6 KING _____ CHUM _____ RED _____	7 KING _____ CHUM _____ RED _____	8 KING _____ CHUM _____ RED _____
9 KING _____ CHUM _____ RED _____	10 KING _____ CHUM _____ RED _____	11 KING _____ CHUM _____ RED _____	12 KING _____ CHUM _____ RED _____	13 KING _____ CHUM _____ RED _____	14 KING _____ CHUM _____ RED _____	15 KING _____ CHUM _____ RED _____
16 KING _____ CHUM _____ RED _____ SILVER _____	17 KING _____ CHUM _____ RED _____ SILVER _____	18 KING _____ CHUM _____ RED _____ SILVER _____	19 KING _____ CHUM _____ RED _____ SILVER _____	20 KING _____ CHUM _____ RED _____ SILVER _____	21 KING _____ CHUM _____ RED _____ SILVER _____	22 KING _____ CHUM _____ RED _____ SILVER _____
23 KING _____ CHUM _____ RED _____ SILVER _____	24 KING _____ CHUM _____ RED _____ SILVER _____	25 KING _____ CHUM _____ RED _____ SILVER _____	26 KING _____ CHUM _____ RED _____ SILVER _____	27 KING _____ CHUM _____ RED _____ SILVER _____	28 KING _____ CHUM _____ RED _____ SILVER _____	29 KING _____ CHUM _____ RED _____ SILVER _____
30 KING _____ CHUM _____ RED _____ SILVER _____	31 KING _____ CHUM _____ RED _____ SILVER _____	  Common name: Red salmon				

TARYAOVAK =
IQALLUK =
SAYAK =


TARYAOVAK =
IQALLUK =
SAYAK =
OAKIYAK =

AUGUST 1989

SUBSISTENCE SALMON CALENDAR

Breeding male  Common name: King salmon		TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5
		KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
SUNDAY	MONDAY					
6	7	8	9	10	11	12
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
13	14	15	16	17	18	19
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
20	21	22	23	24	25	26
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
27	28	29	30	31	Mature female  King salmon	
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____		

SEPTEMBER 1989 SUBSISTENCE SALMON CALENDAR

					FRIDAY	SATURDAY
					1	2
					CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY		
3	4	5	6	7	8	9
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
10	11	12	13	14	15	16
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
17	18	19	20	21	22	23
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
24	25	26	27	28	29	30
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____

PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN OCTOBER.

RED _____ CHUM _____ SILVER _____

THANK YOU for writing your subsistence salmon catches on this calendar.

We appreciate people letting us know the number of salmon that are caught each day for subsistence. This information is used to try and make sure there will be enough salmon for Kuskokwim River and Kuskokwim Bay families.

Please mail this calendar in the attached envelope when you are done salmon fishing.

Division of Subsistence
Alaska Department of Fish and Game
Box 1788
Bethel, Alaska 99559

NAME

Kuskobay
(golden rod)


This calendar is sent to you by the Alaska Department of Fish and Game in Bethel.

PLEASE WRITE THE NUMBER OF ALL SALMON CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR HOUSE. PLEASE INCLUDE SALMON THAT WERE GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES AND SALMON THAT WERE CAUGHT FOR DOGFOOD.

DO NOT INCLUDE SALMON SOLD WHEN COMMERCIAL FISHING.

JUNE 1989

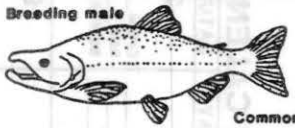
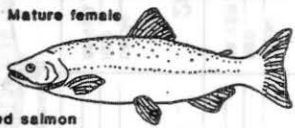
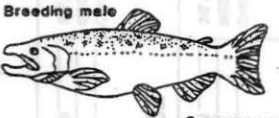
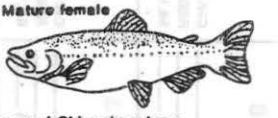
SUBSISTENCE SALMON CALENDAR

WHAT DATE DID YOU START SUBSISTENCE SALMON FISHING THIS YEAR? _____ PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN MAY. KING _____ CHUM _____ RED _____				THURSDAY	FRIDAY	SATURDAY
				1 KING _____ CHUM _____ RED _____	2 KING _____ CHUM _____ RED _____	3 KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY			
4 KING _____ CHUM _____ RED _____	5 KING _____ CHUM _____ RED _____	6 KING _____ CHUM _____ RED _____	7 KING _____ CHUM _____ RED _____	8 KING _____ CHUM _____ RED _____	9 KING _____ CHUM _____ RED _____	10 KING _____ CHUM _____ RED _____
11 KING _____ CHUM _____ RED _____	12 KING _____ CHUM _____ RED _____	13 KING _____ CHUM _____ RED _____	14 KING _____ CHUM _____ RED _____	15 KING _____ CHUM _____ RED _____	16 KING _____ CHUM _____ RED _____	17 KING _____ CHUM _____ RED _____
18 KING _____ CHUM _____ RED _____	19 KING _____ CHUM _____ RED _____	20 KING _____ CHUM _____ RED _____	21 KING _____ CHUM _____ RED _____	22 KING _____ CHUM _____ RED _____	23 KING _____ CHUM _____ RED _____	24 KING _____ CHUM _____ RED _____
25 KING _____ CHUM _____ RED _____	26 KING _____ CHUM _____ RED _____	27 KING _____ CHUM _____ RED _____	28 KING _____ CHUM _____ RED _____	29 KING _____ CHUM _____ RED _____	30 KING _____ CHUM _____ RED _____	

TARYAQVAK =
KANGITNEO =
SAYAK =

JULY 1989

SUBSISTENCE SALMON CALENDAR



Breeding male		Mature female		Common name: Red salmon			SATURDAY
							1 KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY		
2 KING _____ CHUM _____ RED _____	3 KING _____ CHUM _____ RED _____	4 KING _____ CHUM _____ RED _____	5 KING _____ CHUM _____ RED _____	6 KING _____ CHUM _____ RED _____	7 KING _____ CHUM _____ RED _____	8 KING _____ CHUM _____ RED _____	
9 KING _____ CHUM _____ RED _____	10 KING _____ CHUM _____ RED _____	11 KING _____ CHUM _____ RED _____	12 KING _____ CHUM _____ RED _____	13 KING _____ CHUM _____ RED _____	14 KING _____ CHUM _____ RED _____	15 KING _____ CHUM _____ RED _____	
16 KING _____ CHUM _____ RED _____ SILVER _____	17 KING _____ CHUM _____ RED _____ SILVER _____	18 KING _____ CHUM _____ RED _____ SILVER _____	19 KING _____ CHUM _____ RED _____ SILVER _____	20 KING _____ CHUM _____ RED _____ SILVER _____	21 KING _____ CHUM _____ RED _____ SILVER _____	22 KING _____ CHUM _____ RED _____ SILVER _____	
23 KING _____ CHUM _____ RED _____ SILVER _____	24 KING _____ CHUM _____ RED _____ SILVER _____	25 KING _____ CHUM _____ RED _____ SILVER _____	26 KING _____ CHUM _____ RED _____ SILVER _____	27 KING _____ CHUM _____ RED _____ SILVER _____	28 KING _____ CHUM _____ RED _____ SILVER _____	29 KING _____ CHUM _____ RED _____ SILVER _____	
30 KING _____ CHUM _____ RED _____ SILVER _____	31 KING _____ CHUM _____ RED _____ SILVER _____	Breeding male		Mature female			
						Common name: King and Chinook salmon	

TARYAQVAK =
KANGITNEO =
SAYAK =

TARYAQVAK =
KANGITNEO =
SAYAK =
OAKRYAQ =

AUGUST 1989

SUBSISTENCE SALMON CALENDAR

		TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
 KANGITNEO = SAYAK = OAKIYAO =		1 CHUM _____ RED _____ SILVER _____	2 CHUM _____ RED _____ SILVER _____	3 CHUM _____ RED _____ SILVER _____	4 CHUM _____ RED _____ SILVER _____	5 CHUM _____ RED _____ SILVER _____
SUNDAY	MONDAY					
6 CHUM _____ RED _____ SILVER _____	7 CHUM _____ RED _____ SILVER _____	8 CHUM _____ RED _____ SILVER _____	9 CHUM _____ RED _____ SILVER _____	10 CHUM _____ RED _____ SILVER _____	11 CHUM _____ RED _____ SILVER _____	12 CHUM _____ RED _____ SILVER _____
13 CHUM _____ RED _____ SILVER _____	14 CHUM _____ RED _____ SILVER _____	15 CHUM _____ RED _____ SILVER _____	16 CHUM _____ RED _____ SILVER _____	17 CHUM _____ RED _____ SILVER _____	18 CHUM _____ RED _____ SILVER _____	19 CHUM _____ RED _____ SILVER _____
20 CHUM _____ RED _____ SILVER _____	21 CHUM _____ RED _____ SILVER _____	22 CHUM _____ RED _____ SILVER _____	23 CHUM _____ RED _____ SILVER _____	24 CHUM _____ RED _____ SILVER _____	25 CHUM _____ RED _____ SILVER _____	26 CHUM _____ RED _____ SILVER _____
27 CHUM _____ RED _____ SILVER _____	28 CHUM _____ RED _____ SILVER _____	29 CHUM _____ RED _____ SILVER _____	30 CHUM _____ RED _____ SILVER _____	31 CHUM _____ RED _____ SILVER _____	 Breeding male Common name: Chum salmon	

SEPTEMBER 1989

SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
17 CHUM _____ RED _____ SILVER _____	18 CHUM _____ RED _____ SILVER _____	19 CHUM _____ RED _____ SILVER _____	20 CHUM _____ RED _____ SILVER _____	21 CHUM _____ RED _____ SILVER _____	22 CHUM _____ RED _____ SILVER _____	23 CHUM _____ RED _____ SILVER _____
24 CHUM _____ RED _____ SILVER _____	25 CHUM _____ RED _____ SILVER _____	26 CHUM _____ RED _____ SILVER _____	27 CHUM _____ RED _____ SILVER _____	28 CHUM _____ RED _____ SILVER _____	29 CHUM _____ RED _____ SILVER _____	30 CHUM _____ RED _____ SILVER _____

OCTOBER 1989


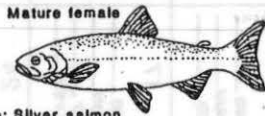
SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 CHUM _____ RED _____ SILVER _____	2 CHUM _____ RED _____ SILVER _____	3 CHUM _____ RED _____ SILVER _____	4 CHUM _____ RED _____ SILVER _____	5 CHUM _____ RED _____ SILVER _____	6 CHUM _____ RED _____ SILVER _____	7 CHUM _____ RED _____ SILVER _____
8 CHUM _____ RED _____ SILVER _____	9 CHUM _____ RED _____ SILVER _____	10 CHUM _____ RED _____ SILVER _____	11 CHUM _____ RED _____ SILVER _____	12 CHUM _____ RED _____ SILVER _____	13 CHUM _____ RED _____ SILVER _____	14 CHUM _____ RED _____ SILVER _____
15 CHUM _____ RED _____ SILVER _____	16 CHUM _____ RED _____ SILVER _____	17 CHUM _____ RED _____ SILVER _____	18 CHUM _____ RED _____ SILVER _____	19 CHUM _____ RED _____ SILVER _____	20 CHUM _____ RED _____ SILVER _____	21 CHUM _____ RED _____ SILVER _____
22 CHUM _____ RED _____ SILVER _____	23 CHUM _____ RED _____ SILVER _____	24 CHUM _____ RED _____ SILVER _____	25 CHUM _____ RED _____ SILVER _____	26 CHUM _____ RED _____ SILVER _____	27 CHUM _____ RED _____ SILVER _____	28 CHUM _____ RED _____ SILVER _____
29 CHUM _____ RED _____ SILVER _____	30 CHUM _____ RED _____ SILVER _____	31 CHUM _____ RED _____ SILVER _____	THANK YOU for writing your subsistence salmon catches on this calendar. We appreciate people letting us know the number of salmon that are caught each day for subsistence. This information is used to try and make sure there will be enough salmon for Kuskokwim River and Kuskokwim Bay families.			

Please mail this calendar in the attached envelope when you are done salmon fishing.

Division of Subsistence
 Alaska Department of Fish and Game
 Box 1788
 Bethel, Alaska 99559

SEPTEMBER 1989 SUBSISTENCE SALMON CALENDAR

					FRIDAY	SATURDAY
 Breeding male  Mature female Common name: Silver salmon					KANGITNEO = SAYAK = OAKIYAO =	
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	1 CHUM _____ RED _____ SILVER _____	2 CHUM _____ RED _____ SILVER _____
3 CHUM _____ RED _____ SILVER _____	4 CHUM _____ RED _____ SILVER _____	5 CHUM _____ RED _____ SILVER _____	6 CHUM _____ RED _____ SILVER _____	7 CHUM _____ RED _____ SILVER _____	8 CHUM _____ RED _____ SILVER _____	9 CHUM _____ RED _____ SILVER _____
10 CHUM _____ RED _____ SILVER _____	11 CHUM _____ RED _____ SILVER _____	12 CHUM _____ RED _____ SILVER _____	13 CHUM _____ RED _____ SILVER _____	14 CHUM _____ RED _____ SILVER _____	15 CHUM _____ RED _____ SILVER _____	16 CHUM _____ RED _____ SILVER _____

NAME

UPPER Kuskokwim
(Ivory)

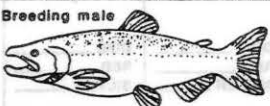
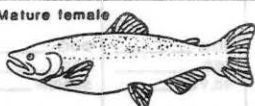
This calendar is sent to you by the Alaska Department of Fish and Game in Bethel.

PLEASE WRITE THE NUMBER OF ALL SALMON CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR HOUSE. PLEASE INCLUDE SALMON THAT WERE GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES AND SALMON THAT WERE CAUGHT FOR DOGFOOD.

DO NOT INCLUDE SALMON SOLD WHEN COMMERCIAL FISHING.

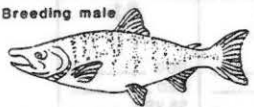
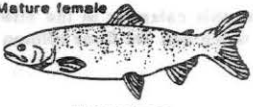
JULY 1989

SUBSISTENCE SALMON CALENDAR


WHAT DATE DID YOU START SUBSISTENCE SALMON FISHING THIS YEAR? _____						SATURDAY
PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN JUNE.						1
KING _____ DOG _____ RED _____						KING _____ DOG _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
2 KING _____ DOG _____ RED _____	3 KING _____ DOG _____ RED _____	4 KING _____ DOG _____ RED _____	5 KING _____ DOG _____ RED _____	6 KING _____ DOG _____ RED _____	7 KING _____ DOG _____ RED _____	8 KING _____ DOG _____ RED _____
9 KING _____ DOG _____ RED _____	10 KING _____ DOG _____ RED _____	11 KING _____ DOG _____ RED _____	12 KING _____ DOG _____ RED _____	13 KING _____ DOG _____ RED _____	14 KING _____ DOG _____ RED _____	15 KING _____ DOG _____ RED _____
16 KING _____ DOG _____ RED _____	17 KING _____ DOG _____ RED _____	18 KING _____ DOG _____ RED _____	19 KING _____ DOG _____ RED _____	20 KING _____ DOG _____ RED _____	21 KING _____ DOG _____ RED _____	22 KING _____ DOG _____ RED _____
23 KING _____ DOG _____ RED _____	24 KING _____ DOG _____ RED _____	25 KING _____ DOG _____ RED _____	26 KING _____ DOG _____ RED _____	27 KING _____ DOG _____ RED _____	28 KING _____ DOG _____ RED _____	29 KING _____ DOG _____ RED _____
30 KING _____ DOG _____ RED _____	31 KING _____ DOG _____ RED _____					
Common names: King and Chinook salmon						

AUGUST 1989

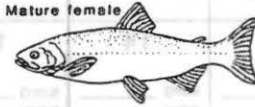
SUBSISTENCE SALMON CALENDAR

Breeding male 		TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Common name: Dog salmon		1	2	3	4	5
		KING _____ DOG _____ RED _____	KING _____ DOG _____ RED _____	KING _____ DOG _____ RED _____	KING _____ DOG _____ RED _____	KING _____ DOG _____ RED _____
SUNDAY	MONDAY					
6 KING _____ DOG _____ RED _____	7 KING _____ DOG _____ RED _____	8 KING _____ DOG _____ RED _____	9 KING _____ DOG _____ RED _____	10 KING _____ DOG _____ RED _____	11 KING _____ DOG _____ RED _____	12 KING _____ DOG _____ RED _____
13 KING _____ DOG _____ RED _____	14 KING _____ DOG _____ RED _____	15 KING _____ DOG _____ RED _____	16 KING _____ DOG _____ RED _____	17 KING _____ DOG _____ RED _____	18 KING _____ DOG _____ RED _____	19 KING _____ DOG _____ RED _____
20 KING _____ DOG _____ RED _____ SILVER _____	21 KING _____ DOG _____ RED _____ SILVER _____	22 KING _____ DOG _____ RED _____ SILVER _____	23 KING _____ DOG _____ RED _____ SILVER _____	24 KING _____ DOG _____ RED _____ SILVER _____	25 KING _____ DOG _____ RED _____ SILVER _____	26 KING _____ DOG _____ RED _____ SILVER _____
27 KING _____ DOG _____ RED _____ SILVER _____	28 KING _____ DOG _____ RED _____ SILVER _____	29 KING _____ DOG _____ RED _____ SILVER _____	30 KING _____ DOG _____ RED _____ SILVER _____	31 KING _____ DOG _____ RED _____ SILVER _____	 Dog salmon	

SEPTEMBER 1989 SUBSISTENCE SALMON CALENDAR

					FRIDAY	SATURDAY
					1	2
					DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY		
3	4	5	6	7	8	9
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
10	11	12	13	14	15	16
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
17	18	19	20	21	22	23
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
24	25	26	27	28	29	30
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____

OCTOBER 1989 SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
8	9	10	11	12	13	14
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
15	16	17	18	19	20	21
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
22	23	24	25	26	27	28
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
29	30	31	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Breeding male</p> </div> <div style="text-align: center;">  <p>Mature female</p> </div> </div> <p style="text-align: center;">Common name: Silver salmon</p>			
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____				

THANK YOU for writing your subsistence salmon catches on this calendar.

We appreciate people letting us know the number of salmon that are caught each day for subsistence. This information is used to try and make sure there will be enough salmon for Kuskokwim River and Kuskokwim Bay families.

Please mail this calendar in the attached envelope when you are done salmon fishing.

Division of Subsistence
Alaska Department of Fish and Game
Box 1788
Bethel, Alaska 99559

Appendix 3

DIVISION OF SUBSISTENCE, BETHEL

(KUSKOKWIM BAY)

King = "taryaqvak,"

Chum = "kangitneq,"

Sockeye = "sayak,"

Silver = "qakiyaq"

Community _____

HHID# & Name _____

Date of Survey _____

Person Interviewed _____

Interviewer _____

Relation to HH _____

KUSKOKWIM AREA

1989 POST-SEASON SUBSISTENCE SALMON HARVEST SURVEY

* (Questions marked with an asterisk are asked of all households interviewed)

*1. We would like to make sure we have the correct name and address for this household.

Name of household head: _____

Mailing address: _____

*2. Do you have a salmon harvest calendar?

Yes ____, No ____, Mailed it in ____, Didn't receive ____, Didn't use ____

*3. Did anyone living in this house fish for subsistence salmon this year?

No ____: Don't usually fish ____, Usually fish ____

Did this household help another household put up salmon?

No ____ (Go to Question 6, next page)

Yes ____:

Which households did this household help (Who, Names, HHID) _____

How many salmon did this household get? (are they all on the calendar?)

KINGS ____ CHUMS ____ SOCKEYES ____ SILVERS ____
("chinook") ("dogs") ("red") ("coho")

Do you know how many salmon all of you caught? No ____

KINGS ____ CHUMS ____ SOCKEYES ____ SILVERS ____

(Go to Question 6, next page) _____

Yes ____

(For calendar holders) (For Non-calendar holders, see next page)

Are all of the salmon this household caught listed on the calendar?

(Ask about salmon cooked, eaten, frozen, dog food, given away)

+ Yes ____: (If calendar was not received in Bethel or is unavailable, get estimates)

Kings ____ Chums ____ Sockeyes ____ Silvers ____

Did other households fish with you?

no ____

yes ____: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes ____

no ____: What other households are they for? _____

How many are for this household?

KINGS ____ CHUMS ____ SOCKEYES ____ SILVERS ____

(Go to Question 4, next page) _____

+ No ____:

How many subsistence salmon did members of this household catch?

KINGS ____ CHUMS ____ SOCKEYES ____ SILVERS ____

Did other households fish with you?

no ____

yes ____: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes ____

no ____: What other households are they for? _____

How many are for this household?

KINGS ____ CHUMS ____ SOCKEYES ____ SILVERS ____

(Go to Question 4, next page) _____

(For Non-calendar holders)**How many subsistence salmon did members of this household catch?**

(Ask about salmon cooked, eaten, frozen, dog food, given away)

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Did other households fish with you?

no _____

yes _____ : (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes _____ (Go to Question 4)

no _____ : What other households are they for? _____

How many are for this household?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

(Go to Question 4) _____

4. Did you harvest salmon for dog food?

No _____ (Go to Question 5)

Yes _____ :

How many?CHUMS _____ SOCKEYES _____ SILVERS _____
("dogs") ("reds") ("cohos")**Are these on the calendar?** Yes _____, No _____**How many dogs do you have?** _____**5. What type(s) of fishing gear was used for catching subsistence salmon this year?**

Drift net _____, Seining _____, Spear _____

Set net _____, Rod-and-reel _____, Other (Identify) _____

***6. Does this household commercial fish?**

No _____ (Go to Question 7)

Yes _____ : (Where? _____ Kuskokwim _____ Yukon _____ Bristol Bay)

Did you keep any of your commercial caught salmon for subsistence use?

No _____ (Go to question 7)

Yes _____ :

How many did you keep?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Are these listed on the salmon calendar? Yes _____, No _____***7. How many people live in this household?** _____**8. (For subsistence fishing households only)****How were the salmon and salmon runs this year?** _____

_____***9. Do you have anything you would like to say about fishing regulations, such as problems or changes you would like to see? (record comments here)*****10. Would you like to receive a summary of results of this survey?** Yes _____, No _____**THANK YOU VERY MUCH.**

This information will be used to help make sure that there will be enough subsistence salmon for Kuskokwim Area families.

King= "taryaqvak,"

Chum= "iqalluk,"

Sockeye= "sayak,"

Silver= "qakiyaq"

Community _____

HHID# & Name _____

Date of Survey _____

Person Interviewed _____

Interviewer _____

Relation to HH _____

KUSKOKWIM AREA

1989 POST-SEASON SUBSISTENCE SALMON HARVEST SURVEY

* (Questions marked with an asterisk are asked of all households interviewed)

- *1. We would like to make sure we have the correct name and address for this household.

Name of household head: _____

Mailing address: _____

- *2. Do you have a salmon harvest calendar?

Yes ____, No ____, Mailed it in ____, Didn't receive ____, Didn't use ____

- *3. Did anyone living in this house fish for subsistence salmon this year?

No ____: Don't usually fish ____, Usually fish ____

Did this household help another household put up salmon?

No ____ (Go to Question 6, next page)

Yes ____:

Which households did this household help (Who, Names, HHID) _____

How many salmon did this household get? (are they all on the calendar?)

KINGS

CHUMS

SOCKEYES

SILVERS

("chinook")

("dogs")

("red")

("coho")

Do you know how many salmon all of you caught? No ____

KINGS

CHUMS

SOCKEYES

SILVERS

(Go to Question 6, next page) _____

Yes ____

(For calendar holders) (For Non-calendar holders, see next page)

Are all of the salmon this household caught listed on the calendar?

(Ask about salmon cooked, eaten, frozen, dog food, given away)

+ Yes ____: (If calendar was not received in Bethel or is unavailable, get estimates)

Kings

Chums

Sockeyes

Silvers

Did other households fish with you?

no ____

yes ____: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes ____

no ____: What other households are they for? _____

How many are for this household?

KINGS

CHUMS

SOCKEYES

SILVERS

(Go to Question 4, next page) _____

+ No ____:

How many subsistence salmon did members of this household catch?

KINGS

CHUMS

SOCKEYES

SILVERS

Did other households fish with you?

no ____

yes ____: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes ____

no ____: What other households are they for? _____

How many are for this household?

KINGS

CHUMS

SOCKEYES

SILVERS

(Go to Question 4, next page) _____

(For Non-calendar holders)**How many subsistence salmon did members of this household catch?**

(Ask about salmon cooked, eaten, frozen, dog food, given away)

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Did other households fish with you?

no _____

yes _____ : (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes _____ (Go to Question 4)

no _____ : **What other households are they for?** _____**How many are for this household?**

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

(Go to Question 4) _____

4. Did you harvest salmon for dog food?

No _____ (Go to Question 5)

Yes _____ :

How many?CHUMS _____ SOCKEYES _____ SILVERS _____
("dogs") ("reds") ("cohos")**Are these on the calendar?** Yes _____, No _____**How many dogs do you have?** _____**5. What type(s) of fishing gear was used for catching subsistence salmon this year?**

Drift net _____, Fish wheel _____, Seining _____, Spear _____

Set net _____, Rod-and-reel _____, Other (Identify) _____

***6. Does this household commercial fish?**

No _____ (Go to Question 7)

Yes _____ : (Where? _____ Kuskokwim _____ Yukon _____ Bristol Bay)

Did you keep any of your commercial caught salmon for subsistence use?

No _____ (Go to question 7)

Yes _____ :

How many did you keep?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Are these listed on the salmon calendar? Yes _____, No _____***7. How many people live in this household? _____****8. (For subsistence fishing households only)****How were the salmon and salmon runs this year?** _____

_____***9. Do you have anything you would like to say about fishing regulations, such as problems or changes you would like to see? (record comments here)**

_____***10. Would you like to receive a summary of results of this survey? Yes _____, No _____****THANK YOU VERY MUCH.** This information will be used to help make sure that there will be enough subsistence salmon for Kuskokwim Area families.

Chinook = "king,"

Chum = "dog salmon,"

Coho = "reds,"

Lime Village also gets sockeyes

Community _____

HHID# & Name _____

Date of Survey _____

Person Interviewed _____

Interviewer _____

Relation to HH _____

KUSKOKWIM AREA

1989 POST-SEASON SUBSISTENCE SALMON HARVEST SURVEY

* (Questions marked with an asterisk are asked of all households interviewed)

- *1. We would like to make sure we have the correct name and address for this household.

Name of household head: _____

Mailing address: _____

- *2. Do you have a salmon harvest calendar?

Yes ___, No ___, Mailed it in ___, Didn't receive ___, Didn't use ___

- *3. Did anyone living in this house fish for subsistence salmon this year?

No ___: Don't usually fish ___, Usually fish ___

Did this household help another household put up salmon?

No ___ (Go to Question 6, next page)

Yes ___:

Which households did this household help (Who, Names, HHID) _____

How many salmon did this household get? (are they all on the calendar?)

KINGS

CHUMS

SOCKEYES

SILVERS

("chinook")

("dogs")

("—")

("reds")

Do you know how many salmon all of you caught? No ___

KINGS

CHUMS

SOCKEYES

SILVERS

(Go to Question 6, next page) _____

Yes ___

(For calendar holders) (For Non-calendar holders, see next page)

Are all of the salmon this household caught listed on the calendar?

(Ask about salmon cooked, eaten, frozen, dog food, given away)

+ Yes ___: (If calendar was not received in Bethel or is unavailable, get estimates)

Kings

Chums

Sockeyes

Silvers

Did other households fish with you?

no ___

yes ___: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes ___

no ___: What other households are they for? _____

How many are for this household?

KINGS

CHUMS

SOCKEYES

SILVERS

(Go to Question 4, next page) _____

+ No ___:

How many subsistence salmon did members of this household catch?

KINGS

CHUMS

SOCKEYES

SILVERS

Did other households fish with you?

no ___

yes ___: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes ___

no ___: What other households are they for? _____

How many are for this household?

KINGS

CHUMS

SOCKEYES

SILVERS

(Go to Question 4, next page) _____

(For Non-calendar holders)**How many subsistence salmon did members of this household catch?**

(Ask about salmon cooked, eaten, frozen, dog food, given away)

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Did other households fish with you?

no _____

yes _____: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes _____ (Go to Question 4)

no _____: **What other households are they for?** _____**How many are for this household?**

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

(Go to Question 4) _____

4. Did you harvest salmon for dog food?

No _____ (Go to Question 5)

Yes _____:

How many?CHUMS _____ SOCKEYES _____ SILVERS _____
("dogs") ("reds") ("reds")**Are these on the calendar? Yes _____, No _____****How many dogs do you have?** _____**5. What type(s) of fishing gear was used for catching subsistence salmon this year?**

Drift net _____, Fish wheel _____, Seining _____, Spear _____

Set net _____, Rod-and-reel _____, Other (Identify) _____

***6. Does this household commercial fish?**

No _____ (Go to Question 7)

Yes _____: (Where? _____ Kuskokwim _____ Yukon _____ Bristol Bay)

Did you keep any of your commercial caught salmon for subsistence use?

No _____ (Go to question 7)

Yes _____:

How many did you keep?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Are these listed on the salmon calendar? Yes _____, No _____***7. How many people live in this household? _____****8. (For subsistence fishing households only)****How were the salmon and salmon runs this year?** _____

_____***9. Do you have anything you would like to say about fishing regulations, such as problems or changes you would like to see? (record comments here)**

_____***10. Would you like to receive a summary of results of this survey? Yes _____, No _____****THANK YOU VERY MUCH.**

This information will be used to help make sure that there will be enough subsistence salmon for Kuskokwim Area families.

Appendix 4

Dear Kuskokwim Area Resident,

Each spring the Alaska Department of Fish and Game mails subsistence salmon catch calendars to households that we think fish salmon for subsistence use. This postcard was mailed to you as part of our effort to collect information about the harvest of Kuskokwim salmon for subsistence use. We would appreciate your assistance by filling out the back side of the bottom of this postage paid card and dropping it in the mail to us.

This information will be used to help make sure there will be enough salmon for Kuskokwim area families.

Thank you,
Bethel Subsistence Division Office
(543-3100)

Division of Subsistence
Alaska Dept. of Fish and Game
P.O. Box 1788
Bethel, Alaska 99559

Division of Subsistence
Alaska Dept. of Fish and Game
P.O. Box 1788
Bethel, Alaska 99559

Division of Subsistence
Alaska Dept. of Fish and Game
P.O. Box 1788
Bethel, Alaska 99559

Mailing label goes here

(address correction requested)

NAME _____
P.O. BOX _____
CITY, _____
STATE, ZIPCODE _____

1. Did your household harvest salmon for subsistence use during 1989?

(eaten fresh, smoked, frozen, or used as dog food?)

Yes _____ No _____

2. How many salmon did your household harvest for subsistence use?

(include the salmon you kept for subsistence use when commercial fishing)

Chinoök _____ Chum _____ Sockeye _____ Silver _____
(king) (dog) (red) (coho)

3. Would you like to receive a copy of the 1989 Kuskokwim Area subsistence salmon harvest summary?

Yes _____ No _____